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AND OTHER ESSAYS.

BY

R. A. PROCTOR.

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HEREDITARY TRAITS,

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By Richard A. Proctor.

I.

HEREDITARY TRAITS.

In Montaigne's well known essay on the "Resemblance of Children to their Fathers," the philosopher of Périgord remarks that "there is a certain sort of crafty humility that springs from presumption; as this, for example, that we confess our ignorance in many things, and are so courteous as to acknowledge that there are in works of nature some qualities and conditions that are imperceptible to us, and of which our understanding cannot discern the means and causes; by which honest declaration we hope to obtain that people shall also believe us of those that we say we do understand." "We need not trouble ourselves," he goes on, "to seek out miracles and strange difficulties; methinks there are such incomprehensible wonders amongst the things that we ordinarily see as surpass all difficulties of miracles." He applies these remarks to inherited peculiarities of feature, figure, character, constitution, habits, and so forth. And certainly few of the phenomena of nature are more wonderful than these, in the sense of being less obviously referable to any cause which seems competent to produce them. Many of those natural phenomena which are regarded as most striking are in this respect not to be compared with the known phenomena of heredity. The motions of the planets can all be referred to regular laws; chemical changes are systematic, and their sequence at least is understood; the phenomena of heat, light, and electricity are gradually finding interpretation. It is true that all these phenomena become in a sense as miracles when we endeavor to ascertain their real cause. In their case we can ascertain the "how," but in no sense the "why." Gravity is a mystery of mysteries to the astronomer, and has almost compelled us to believe in that "action at a distance" which Newton asserted to be unimaginable by anyone with a competent power of reasoning about things philosophical. The ultimate cause of chemical changes is as great a mystery now as it was when the four elements were believed in. And the nature of

the ether itself in which the undulations of heat, light and electricity are transmitted is utterly mysterious even to those students of science who have been most successful in determining the laws according to which those undulations proceed. But the phenomena themselves, being at once referable (in our own time at least) to law, have no longer the mysterious and in a sense miraculous character recognized in them before the laws of motion, of chemical affinity, of light and heat and electricity had been ascertained. It is quite otherwise with the phenomena of heredity. We know nothing even of the proximate cause of any single phenomenon; far less of that ultimate cause in which all these phenomena had their origin. The inheritance of a trait of bodily figure, character, or manner is a mystery as great as that other and cognate mystery, the appearance of some seemingly sudden variation in a race which has for many generations presented an apparently unvarying succession of attributes, bodily, physical or mental.

It need hardly be said that this would not be the place for the discussion of the problems of heredity and variation, even if in the present position of science we could hope for any profitable result from the investigation of either subject. But some of the curious facts which have been noted by various students of heredity will, I think, be found interesting; and though not suggesting in the remotest degree any solution of the real difficulties of the subject, they may afford some indication of the laws according to which parental traits are inherited, or seemingly sudden variations introduced.

The commonest, and therefore the least interesting, though perhaps the most instructive of the phenomena of heredity, are those affecting the features and the outward configuration of the body. These have been recognized in all ages and among all nations. A portion of the Jewish system of legislature was based on a recognition of the law that children inherit the bodily qualities of the parents. The Greeks noted the same fact. Among the Spartans, indeed, a system of selection from among newborn children prevailed, which, though probably intended only to eliminate the weaker individuals, corresponded closely to what would be done by a nation having full belief in the efficacy of both natural and artificial selection, and not troubled with any strong scruples as to the method of applying their doctrines on such matters. Among the Romans we find certain families described by their physical characteristics, as the *Nasones* or Big-nosed, the *Labeones* or Thick-lipped, the *Capitones* or Big-headed, the *Buccones* or Swollen-cheeked. In more recent times similar traits have been recognized in various families. The Austrian lip and Bourbon nose are well known instances.*

Peculiarities of structure have a double interest, as illustrating both variation and persistence. We usually find them introduced without any apparent cause into a family, and afterwards they remain as hereditary traits, first inherited regularly, then intermittently, and eventually, in most cases, dying out or becoming so exceptional that their occurrence is not regarded as an hereditary peculiarity. Montaigne mentions that in the family of Lepidus, at Rome, there were three, not successively but by intervals, that were born with the same eye covered with a cartilage. At Thebes there was a family almost every member of which had the crown of the head pointed like a lance-head; all whose heads were not so formed being regarded as illegitimate. A better authenticated case is that of the Lambert family. The peculiarity affecting this family appeared first in the person of Edward Lambert, whose whole body, except the face, the palms of the hands, and the soles of the feet,

* It is said by Ribot that of all the features the nose is the one which heredity preserves best.

was covered with a sort of shell consisting of horny excrescences. He was the father of six children, all of whom, so soon as they had reached the age of six weeks, presented the same peculiarity. Only one of them lived. He married, and transmitted the peculiarity to all his sons. For five generations all the male members of the Lambert family were distinguished by the horny excrescences which had adorned the body of Edward Lambert.

A remarkable instance of the transmission of anomalous characteristics is found in the case of Andrian Jeftichjew, who, three or four years ago, was exhibited with his son Fedor Jeftichjew in Berlin and Paris. They were called in Paris *les hommes-chiens*, or dog-men, the father's face being so covered with hair as to present a striking resemblance to the face of a Skye terrier. Andrian was thus described: "He is about fifty-five years of age, and is said to have been the son of a Russian soldier. In order to escape the derision and the unkind usage of his fellow-villagers, Andrian in early life fled to the woods, where for some time he lived in a cave.

"During this period of seclusion he was much given to drunkenness. His mental condition does not seem to have suffered, however, and he is on the whole of a kindly and affectionate disposition. It may be of interest to state that he is an orthodox member of the Russo-Greek Church, and that, degraded as he is intellectually, he has very definite notions about heaven and the hereafter. He hopes to introduce his frightful countenance into the court of heaven; and he devotes all the money he makes, over and above his outlay for creature comforts, to purchasing the prayers of a devout community of monks in his native village, Kostroma, after his mortal career is ended. He is of medium stature, but very strongly built. His excessive capillary development is not true hair, but simply an abnormal growth of the *down* or fine hairs which usually cover nearly the entire surface of the human body Strictly speaking, he has neither head-hair, beard, moustache, eyebrows, nor eyelashes, their place being taken by this singular growth of long silky down. In color this is of a dirty yellow; it is about three inches in length all over the face, and feels like the hair of a Newfoundland dog. The very eyelids are covered with this long hair, while flowing locks come out of his nostrils and ears. On his body are isolated patches, strewed, but not thickly, with hairs one and a-half to two inches long." Dr. Bertillon, of Paris, compared a hair from Andrian's chin with a very fine hair from a man's beard, and found that the latter was three times as thick as the former; and a hair from Andrian's head is only one-half as thick as an average human hair. Professor Virchow, of Berlin, made careful inquiry into the family history of Andrian Jeftichjew. So far as could be learned, Andrian was the first in whom this wonderful hirsuteness had been noticed. Neither his reputed father nor his mother presented any peculiarity of the kind, and a brother and sister of his, who are still living, are in no way remarkable for capillary development. The son Fedor, who was exhibited in company with Andrian, was illegitimate, and about three years of age. Andrian's legitimate children, a son and a daughter, both died young. Nothing is known of the former; but the daughter resembled the father. "Fedor is a sprightly child," said the account from which we have already quoted, "and appears more intelligent than the father." The growth of down on his face is not so heavy as to conceal his features; but there is no doubt that, when the child comes to maturity, he will be at least as hirsute as his parent. The hairs are as white and as soft as the fur of the Angora cat, and are longest at the outer angles of the eyes. There is a thick tuft between the eyes, and the nose is well covered. The moustache

joins the whiskers on each side, after the English fashion, and this circumstance gives to accurate pictures of the child a ludicrous resemblance to a well-fed Englishman of about fifty. As in the father's case, the inside of Fedor's nostrils and ears has a thick crop of hair. Both father and son are almost toothless, Andrian having only five teeth, one in the upper jaw and four in the lower, while the child has only four teeth, all in the lower jaw. In both cases the four lower teeth are all incisors. To the right of Andrian's one upper tooth there still remains the mark of another which has disappeared. That beyond these six teeth the man never had any others is evident to any one who feels the gums with the finger."

The deficiency of teeth, accompanied as it is by what is in reality a deficiency, not a renundancy of hair —for Andrian and his son have no real hair—accords well with Darwin's view, that a constant correlation exists between hair and teeth. He mentions as an illustration the deficiency of teeth in hairless dogs. The tusks of the boar, again, are greatly reduced under domestication, and the reduction is accompained by a corresponding diminution of the bristles. He mentions also the case of Julia Pastrana, a Spanish dancer or opera singer, who had a thick masculine beard and a hairy forehead, while her teeth were so redundant that her mouth projected, and her face had a gorilla-like appearance. It should rather be said that, in general, those creatures which present an abnormal development in the covering of their skin, whether in the way of redundancy or deficiency, present, generally, perhaps always, an abnormal dental development, as we see in sloths and armadilloes on the one hand, which have the front teeth deficient, and in some branches of the whale family on the other, in which the teeth are redundant either in number or in size. In individual members of the human family it certainly is not always the case that the development of the hair and that of the teeth are directly correlated; for some who are bald when quite young have excellent teeth, and some who have lost most of their teeth while still on the right side of forty have excellent hair to an advanced age.*

Another case, somewhat similar to that of Andrian and his son, is found in a Burmese family, living at Ava, and first described by Crawford in 1829. Shwe-Maong, the head of the family, was about thirty years old. His whole body was covered with silky hairs, which attained a length of nearly five inches on the shoulders and spine. He had four daughters, but only one of them resembled him. She was living at Ava in 1855, and, according to the account given by a British officer who saw her there, she had a son who was hairy like his grandfather, Shwe-Maong. The case of this family illustrates rather curiously the relation between the hair and teeth. For Shwe-Maong retained his milk teeth till he was twenty years old (when he attained puberty), and they were replaced by nine teeth only, five in the upper and four in the lower jaw. Eight of these were incisors, the ninth (in the upper jaw) being a canine tooth.

Sex-digitism, or the possession of hands and feet with six digits each, has occurred in several families as a sudden variation from the normal formation, but after it has appeared has usually been transmitted for several generations. In the case of the Colburn family this peculiarity lasted

* Shakespeare, who was bald young (and, so far as one can judge from his portraits, had a good set of teeth), suggests a correlation between hairiness and want of wit, which is at least likely to be regarded by those who "wear his baldness while they're young," as a sound theory. "Why," asks Antipholus of Syracuse, "is Time such a niggard of hair, being, as it is, so plentiful an excrement?" "Because," says Dromio of Syracuse, "it is a blessing that he bestows on beasts; and what he hath scanted men in hair he hath given them in wit."

for four generations without interruption, and still reappears occasionally. In a branch of a well-known Scotch family, sex-digitism—after continuing for three or four generations—has apparently disappeared; but it still frequently happens that the edge of the hands on the side of the little finger is partially deformed.

Hare-lip, albinism, halting and other peculiarities commonly reappear for four or five generations, and are seldom altogether eradicated in less than ten or twelve.

The tendency to variation shown in the introduction of these peculiarities, even though they may have been eventually eradicated, is worth noticing in its bearing on our views respecting the formation of new and persistent varieties of the human as of other races. It must be noticed that in the case of the human race the conditions not only do not favor the continuance of such varieties, but practically forbid their persistence. It is otherwise with some varieties, at least, of domestic animals, insomuch that varieties which present any noteworthy even though accidentally observed advantage have been made practically persistent; we say practically, because there seems little reason to doubt that in every case which has hitherto been observed the normal type would eventually be reverted to if special pains were not taken to separate the normal from the abnormal form.

An excellent illustration of the difference between the human race and a race of animals under domestication, in this particular respect, is found in the case of the Kelleia family on the one hand, and that of the Ancon or Otter sheep on the other.

The former case is described by Reaumur. A Maltese couple named Kelleia, whose hands and feet were of the ordinary type, had a son, Gratio, who had six movable fingers on each hand and six somewhat less perfect toes on each foot. Gratio Kelleia married a woman possessing only the ordinary number of fingers and toes. There were four children of this marriage—Salvator, George, Andre and Marie. Salvator had six fingers and six toes like the father; George and Andre had each five fingers and five toes like the mother, but the hands and feet of George were slightly deformed; Marie had five fingers and five toes, but her thumbs were slightly deformed. All four children grew up, and married folk with the ordinary number of fingers and toes. The children of Andre alone (who were many) were without exception of the normal type, like their father. The children of Salvator, who alone was six-fingered and six-toed like Gratio, the grandfather, were four in number; three of them resembled the father, while the other—the youngest—was of the normal type like his mother and grandmother. As these four children were the descendants of four grandparents of whom one only was hexadactylic, we see that the variety had been strong enough in their case to overcome the normal type in threefold greater strength. But the strangest part of the story is that relating to George and Marie. George, who was a pentadactyle, though somewhat deformed about the hands and feet, was the father of four children; first, two girls, both purely hexadactylic; next, a girl, hexadactylic on the right side of the body and pentadactylic on the left side; and lastly, a boy, purely pentadactylic. Marie, a pentadactyle with deformed thumbs, gave birth to a boy with six toes, and three normally formed children. It will be seen, however, that the normal type showed itself in greater force than the variety in the third generation from Gratio; for while one child of Salvator's, one of George's, three of Marie's, and all of Andre's (some seven or eight) were of the normal type—twelve or thirteen in all—only five, viz., three of Salvator's and two of George's, presented the variety purely. Three others were more or less abnormally formed in fingers and toes; but even

counting these, the influence of the variety was shown only in eight of the grandchildren of Gratio, whereas twelve or thirteen were of the normal type.

The story of the Ancon or Otter sheep, as narrated by Colonel David Humphreys in a letter to Sir Joseph Banks, published in the *Philosophical Transactions* for 1813, has been thus abridged by Huxley: "It appears that one Seth Wright, the proprietor of a farm on the banks of the Charles River, in Massachusetts, possessed a flock of fifteen ewes and a ram of the ordinary kind. In the year 1791 one of the ewes presented her owner with a male lamb differing, for no assignable reason, from its parents by a disproportionately long body and short bandy legs; whence it was unable to emulate its relatives in those sportive leaps over the neighbors' fences in which they were in the habit of indulging, much to the good farmer's vexation. With the 'cuteness' characteristic of their nation, the neighbors of the Massachusetts farmer imagined it would be an excellent thing if all his sheep were imbued with the stay-at-home tendencies enforced by Nature upon the newly-arrived ram; and they advised Wright to kill the old patriarch of his fold and install the new Ancon ram in his place. The result justified their sagacious anticipations. . . . The young lambs were almost always either pure Ancons or pure ordinary sheep. But when sufficient Ancon sheep were obtained to interbreed with one another, it was found that the offspring were always pure Ancon. Colonel Humphreys, in fact, states that he was acquainted with only 'one questionable case of a contrary nature.' By taking care to select Ancons of both sexes for breeding from, it thus became easy to establish an exceedingly well-marked race—so peculiar that even when herded with other sheep, it was noted that the Ancons kept together. And there is every reason to believe that the existence of this breed might have been indefinitely protracted, but the introduction of the Merino sheep—which were not only very superior to the Ancons in wool and meat, but quite as quiet and orderly—led to the complete neglect of the new breed, so that in 1813 Colonel Humphreys found it difficult to obtain the specimen whose skeleton was presented to Sir Joseph Banks. We believe that for many years no remnant of it has existed in the United States."

It is easy, as Huxley remarks, to understand why, whereas Gratio Kelleia did not become the ancestor of a race of six-fingered and six-toed men, Seth Wright's Ancon ram became a nation of long-bodied, short-legged sheep. If the purely hexadactylic descendants of Gratio Kelleia, and all the purely hexadactylic members of the Colburn family, in the third and fourth generations, had migrated to some desert island, and had been careful not only to exclude all visitors having the normal number of fingers and toes, but to send away before the age of puberty all children of their own which might depart in any degree from the pure hexadactylic type, there can be no doubt that, under favorable conditions, the colony would have become a nation of six-fingered folk. Among such a nation the duodecimal system of notation would flourish, and some remarkable performers on the pianoforte, flute, and other instruments might be looked for; but we do not know that they would possess any other advantage over their pentadactylic contemporaries. Seeing that the system of colonizing above described is antecedently unlikely, and that no special advantage could be derived from the persistence of any hitherto known abnormal variety of the human race, it is unlikely that, for many generations yet to come, we shall hear of six-fingered, hairy-faced, horny-skinned, or hare-lipped nations. The only peculiarities which have any chance of becoming permanent are such as, while not very uncommon, stand in the way of intermarriage with persons not similarly affected. A similar re-

mark, as will presently appear, applies to mental and moral characteristics. The law according to which contrast is found attractive and similitude repugnant, though wide in its range, is not universal; and there are cases in which resemblance, if it has not the charm found (under ordinary circumstances) in contrast, is yet a necessary element in matrimonial alliances.

The inheritance of constitutional traits comes next to be considered. It is probably not less frequently observed, and is, in several respects, more interesting than the inheritance of peculiarities of bodily configuration.

Longevity, which may be regarded as measuring the aggregate constitutional energy, is well known to be hereditary in certain families, as is short duration of life in other families. The best proof that this is the case is found in the action of insurance companies, in ascertaining through their agents the longevity of the ancestors of persons proposing to insure their lives. Instances of longevity during several successive generations are too common to be worth citing. Cases in which, for generation after generation, a certain age, far short of the threescore years and ten, has not been passed, even when all the circumstances have favored longevity, are more interesting. One of the most curious among these is the case of the Turgot family, in which the age of fifty-nine had not been for generations exceeded, to the time when Turgot made the name famous. At the age of fifty, when he was in excellent health, and apparently had promise of many years of life, he expressed to his friends his conviction that the end of his life was near at hand. From that time forward he held himself prepared for death, and, as we know, he died before he had completed his fifty-fourth year.

Fecundity is associated sometimes with longevity, but in other cases it is as significantly associated with short duration of life. Of families in which many children are born, but few survive, we naturally have less striking evidence than we have of families in which many children of strong constitutions are born for several successive generations. What may be called the fecundity of the short-lived is a quality commonly leading in no long time to the disappearance of the family in which it makes its appearance. It is the reverse, of course, with fecundity in families whose members show individually great vigor of constitution and high vital power. Ribot mentions several cases of this sort among the families of the old French *noblesse*. Thus Anne de Montmorency —who, despite his feminine name, was certainly by no means feminine in character (at the Battle of St. Denis, in his sixty-sixth year, he smashed with his sword the teeth of the Scotch soldier who was giving him his death-blow) was the father of twelve children. Three of his ancestors, Matthew I., Matthew II. and Matthew III., had, in all, eighteen children, of whom fifteen were boys. "The son and grandson of the great Condé had nineteen between them, and their great-grandfather, who lost his life at Jarnac, had ten. The first four Guises reckoned in all forty-three children, of whom thirty were boys. Achille de Harley had nine children, his father ten, and his great-grandfather eighteen." In the family of the Herschels, in Hanover and in England, a similar fecundity has been shown in two generations out of three. Sir W. Herschel was one of a family of twelve children, of whom five were sons. He himself did not marry till his fiftieth year, and had only one son. But Sir John Herschel was the father of eleven children.

Of constitutional peculiarities those affecting the nervous system are most frequently transmitted. We do not, however, consider them at this point, because they are viewed ordinarily rather as they relate to mental and moral characteristics than as affec-

tions of the body. The bodily affections most commonly transmitted are those depending on what is called diathesis—a general state or disposition of the constitution predisposing to some special disease. Such are scrofula, cancer, tubercular consumption, gout, arthritis, and some diseases specially affecting the skin. It would not be desirable to discuss here this particular part of our subject, interesting though it undoubtedly is. But it may be worth while to note that we have, in the variety of forms in which the same constitutional bad quality may present itself, evidence that what is actually transmitted is not a peculiarity affecting a particular organ, even though in several successive generations the disease may show itself in the same part of the body, but an affection of the constitution generally. We have here an answer to the question asked by Montaigne in the essay from which we have already quoted. The essay was written soon after he had for the first time experienced the pangs of renal calculus: "'Tis to be believed," he says, "that I derived this infirmity from my father, for he died wonderfully tormented" with it; he was "never sensible of his disease till the sixty-seventh year of his age, and before that had never felt any grudging or symptom of it" . . . "but lived till then in a happy, vigorous state of health, little subject to infirmities, and continued seven years after in this disease, and dyed a very painful death. I was born about twenty-five years before his disease seized him, and in the time of his most flourishing and healthful state of body, his third child in order of birth: where could his propension to this malady lie lurking all that while? And he being so far from the infirmity, how could that small part of his substance carry away so great an impression of its share? And how so concealed that, till five-and-forty years after, I did not begin to be sensible of it? being the only one to this hour, amongst so many brothers and sisters, and all of one mother, that was ever troubled with it. He that can satisfie me in this point, I will believe him in as many other miracles as he pleases, always provided that, as their manner is, he does not give me a doctrine much more intricate and fantastic than the thing itself, for current pay." When we note, however, that in many cases the children of persons affected like the elder Montaigne are not affected like the parents, but with other infirmities, as the tendency to gout, and *vice versa* (a circumstance of which I myself have but too good reason to be cognizant, a parent's tendency to gout having in my case been transmitted in the modified but even more troublesome form of the disease which occasioned Montaigne so much anguish), we perceive that it is not "some small parts of the substance" which transmits its condition to the child, but the general state of the constitution. Moreover, it may be hoped in many cases (which would scarcely be the case if the condition or qualities of some part of the body only were transmitted) that the germs of disease, or rather the predisposition to disease, may be greatly diminished, or even entirely eradicated by suitable precautions. Thus persons inheriting a tendency to consumption have become, in many cases, vigorous and healthy by passing as much of their time as possible in the open air, by avoiding crowded and over-heated rooms, taking moderate but regular exercise, judicious diet, and so forth. We believe that the disease which troubled the last fifteen years of the life of Montaigne might readily have been prevented, and the tendency to it eradicated, during his youth.

Let us turn, however, from these considerations to others more interesting, though less important, and on the whole perhaps better suited to these pages.

The inheritance of tricks or habits is one of the most perplexing of all the phenomena of heredity. The less striking the habit, the more remarkable, perhaps, is its persistence as an inherited trait. Giron de Buza-

reingues states that he knew a man who, when he lay on his back, was wont to throw his right leg across the left; one of this person's daughters had the same habit from her birth, constantly assuming that position in the cradle, notwithstanding the resistance offered by the swaddling bands.* Darwin mentions another case in his *Variation of Animals and Plants Under Domestication:* A child had the odd habit of setting its fingers in rapid motion whenever it was particularly pleased with anything. When greatly excited, the same child would raise the hand on both sides as high as the eyes, with the fingers in rapid motion as before. Even in old age he experienced a difficulty in refraining from these gestures. He had eight children, one of whom, a little girl, when four years of age, used to set her fingers going, and to lift up her hands after the manner of her father. A still more remarkable case is described by Galton. A gentleman's wife noticed that when he lay fast asleep on his back in bed he had the curious trick of raising his right arm slowly in front of his face, up to his forehead, and then dropping it with a jerk, so that the wrist fell heavily on the bridge of his nose. The trick did not occur every night, but occasionally, and was independent of any ascertained cause. Sometimes it was repeated incessantly for an hour or more. The gentleman's nose was prominent, and its bridge often became sore from blows which it received. At one time an awkward sore was produced that was long in healing, on account of the recurrence, night after night, of the blows which first caused it. His wife had to remove the button from the wrist of his night-gown, as it made severe scratches, and some means were attempted of tying his arm. Many years after his death, his son married a lady who had never heard of the family incident. She, however, observed precisely the same peculiarity in her husband; but his nose, from not being particularly prominent, has never as yet suffered from the blows. The trick does not occur when he is half asleep, as, for example, when he is dozing in his arm-chair; but the moment he is fast asleep, he is apt to begin. It is, as with his father, intermittent; sometimes ceasing for many nights, and sometimes almost incessant during a part of every night. It is performed, as it was with his father, with his right hand. One of his children, a girl, has inherited the same trick. She performs it, likewise, with the right hand, but in a slightly modified

* While penning the above lines I have been reminded of an experience of my own, which I had never before thought of as connected with the subject of heredity; yet it seems not unlikely that it may be regarded as a case in point. During the infancy of my eldest son it so chanced that the question of rest at night, and consequently the question of finding some convenient way of keeping the child quiet, became one of considerable interest to me. Cradle-rocking was effective, but, carried on in the usual way, prevented my own sleep, though causing the child to sleep. I devised, however, a way of rocking the cradle with the foot, which could be carried on in my sleep, after a few nights' practice. Now, it is an odd coincidence (only, perhaps) that the writer's next child, a girl, had, while still an infant, a trick which I have noticed in no other case. She would rock herself in the cradle by throwing the right leg over the left at regular intervals, the swing of the cradle being steadily kept up for many minutes, and being quite as wide in range as a nurse could have given. It was often continued when the child was asleep.

Since writing the above, I have learned from my eldest daughter, the girl who, as a child, had the habit described, that a recent little brother of hers, one of twins, and remarkably like her, had the same habit, rocking his own cradle so vigorously as to disturb her in the next room with the noise. These two only of twelve children have had this curious habit; but as this child is thirteen years younger than she is, the force of the coincidence in point of time is to some degree impaired.

form; for after raising the arm, she does not allow the wrist to drop upon the bridge of the nose, but the palm of her half-closed hand falls over and down the nose, striking it rather rapidly—a decided improvement on the father's and grandfather's method. The trick is intermittent in this girl's case also, sometimes not occurring for periods of several months, but sometimes almost incessantly.

Strength in particular limbs or muscles is often transmitted hereditarily. So also is skill in special exercises. Thus in the north country there are families of famous wrestlers. Among professional oarsmen, again, we may note such cases as the Clasper family in the north, the Mackinneys in the south; while among amateur oarsmen we have the case of the Playford family, to which the present amateur champion sculler belongs. In cricket, the Walker family and the Grace family may be cited among amateurs, the Humphreys among professional players. Grace in dancing was transmitted for three generations in the Vestris family. It must, however, be noted that in some of these cases we may fairly consider that example and teaching have had much to do with the result. Take rowing for instance. A good oarsman will impart his style to a whole crew if he rows stroke for them; and even if he only trains them (as Morrison, for instance, trained the Cambridge crew a few years ago), he will make good oarsmen of men suitably framed and possessing ordinary aptitude for rowing. I remember well how a famous stroke-oar at Cambridge (John Hall, of Magdalen) imparted to one at least of the University crew (a fellow-collegian of his, and therefore rowing with him constantly also in his College boat) so exact an imitation of his style that one rather dusky evening, when the latter was "stroking" a scratch four past a throng of University men, a dispute arose as to which of the two was really stroke of the four. Anyone who knows how characteristic commonly is the rowing of any first-class stroke, and still more anyone who chances to know how peculiar was the style of the University "stroke-oar" referred to, will understand how closely his style must have been adopted, when experienced oarsmen, not many yards from the passing four, were unable to decide at once which of the two men were rowing—even though the evening was dusky enough to prevent the features of the stroke (whose face was not fully in view at the moment) from being discerned. Seeing that a first-rate oarsman can thus communicate his style so perfctly to another, it cannot be regarded as demonstrably a case of hereditary transmission of the Claspers rowed in the same style as their father, or if the present champion amateur sculler (making allowances for the change introduced by the sliding seat) rows very much like his father and his uncle.

Some peculiarities, such as stammering, lisping, babbling, and the like, are not easily referable to any special class of hereditary traits, because it is not clear how far they are to be regarded as depending on bodily or how far on mental peculiarities. It might seem obvious that stammering was in most cases uncontrollable by the will, and babbling might seem as certainly controllable. Yet there are cases which throw doubt on either conclusions. Thus, Dr. Lucas tells us of a servant-maid whose loquacity was apparently quite uncontrollable. She would talk to people till they were ready to faint; and if there were no human being to listen to her, she would talk to animals and inanimate objects, or would talk aloud to herself. She had to be discharged. "But," she said to her master, "I am not to blame; it all comes from my father. He had the same fault, and it drove my mother to distraction; and his father was just the same." Stammering has been transmitted through as many as five generations. The same has been noticed of peculiarities of vision. The Montmorency look, a sort of half squint, affected

nearly all the members of the Montmorency family. The peculiarity called Daltonism, an inability to distinguish between certain colors of the spectrum, was not so named, as is often asserted, merely because the distinguished chemist Dalton was affected by it, but because three members of the same family were similarly affected. Deafness and blindness are not commonly hereditary where the parents have lost sight or hearing either by accident or through illness, even though the illness or accident occur during infancy; but persons born either blind or deaf frequently if not commonly transmit the defect to some at least among their offspring. Similar remarks apply to deaf-mutism.

The senses of taste and smell must also be included in the list of those which are affected by transmitted peculiarities. If we include the craving for liquor among such peculiarities, we might at once cite a long list of cases; but this craving must be regarded as nervo-physical, the sense of taste having in reality very little to do with it. It is doubtful how the following hideous instance should be classed. It is related by Dr. Lucas: "A man in Scotland had an irresistible desire to eat human flesh. He had a daughter; although removed from her father and mother, who were both sent to the stake before she was a year old, and although brought up among respectable people, this girl, like her father, yielded to the horrible craving for human flesh." He must be an ardent student of physiological science who regrets that, at this stage, circumstances intervened which prevented the world from ascertaining whether the peculiarity would have descended to the third and fourth generations.

Amongst the strangest cases of hereditary transmissions are those relating to handwriting. Darwin cites several curious instances in his *Variation of Plants and Animals under Domestication*. "On what a curious combination of corporeal structure, mental character, and training, he remarks, "must handwriting depend. Yet everyone must have noted the occasional close similarity of the handwriting in father and son, even although the father had not taught the son. A great collector of franks assured me that in his collection there were several franks of father and son hardly distinguishable except by their dates." Hofacker, in Germany, remarks on the inheritance of handwriting, and it has been even asserted that English boys, when taught to write in France, naturally cling to their English manner of writing. Dr. Carpenter mentions the following instance as having occurred in his own family, as showing that the character of the handwriting is independent of the special teaching which the right hand receives in this art: "A gentleman who emigrated to the United States and settled in the back-woods, before the end of last century, was accustomed, from time to time, to write long letters to his sister in England, giving an account of his family affairs. Having lost his right arm by an accident, the correspondence was temporarily kept up by one or other of his children; but in the course of a few months he learned to write with his left hand, and, before long, the handwriting of the letters thus written came to be indistinguishable from that of his former letters."

I had occasion, two or three years ago, to consider in an article on "Strange Mental Feats," in my *Science Byeways*, the question of inherited mental qualities and artistic habits, and would refer the reader for some remarkable instances of transmitted powers to that article.* Galton in his work on *Hereditary Genius*, and Ribot in his treatise on *Heredity*, have collected many facts bearing on this interesting question. Both writers show a decided bias in favor of a view which would give to heredity a rather too important position among the factors of genius. Cases are cited which seem very little

* See my *Science Byeways*, p. 337 *et seq.*

to the purpose, and multitudes of instances are omitted which oppose themselves, at a first view at any rate, to the belief that heredity plays the first part in the genesis of great minds. Nearly all the greatest names in philosophy, literature, and science, and a great number of the greatest names in art, stand absolutely alone. We know nothing achieved by the father or grandfather of Shakspeare, or of Goethe, or Schiller, or Evans (George Eliot), or Thackeray, or Dickens, or Huxley. None of Newton's family were in any way distinguished in mathematical or scien tific work; nor do we know of a distinguished Laplace, or Lagrange, or Lavoisier, or Harvey, or Dalton, or Volta, or Faraday, besides those who made these names illustrious. As to general literature, page after page might be filled with the mere names of those whose ancestry have been quite undistinguished. To say that among the ancestors of Goethe, Schiller, Byron, and so forth, certain qualities, virtues or vices, passions or insensibilities to passion, may be recognized "among the ancestors of men of science, certain aptitudes for special subjects or methods of search," among the ancestors of philosophers and literary men, certain qualities or capabilities, and that such ancestral peculiarities determined the poetic, scientific or literary genius of the de scendent, is in reality to little purpose, for there is probably not a single family possessing claims to culture in any civilized country among the members of which individuals might not be found with qualities thus emphasized, so to speak. Such *a posteriori* reasoning is valueless. If instances could be so classified that after carefully studying them we could make even the roughest approach to a guess respecting the cases in which a family might be expected to produce men of any particular qualities, there would be some use in these attempts at generalization; at present all that can be said is that some mental qualities and some artistic aptitudes have unquestionably in certain instances been transmitted, and that on the whole men of great distinction in philosophy, literature, science and art are rather more likely than others to have among their relations (more or less remote) persons somewhat above the average in mental or artistic qualities. But it is not altogether certain that this superiority is even quite so great as it might be expected to be if hereditary transmission played no part at all in the matter. For it cannot be denied that a great mathematician's son has rather a better chance than others of being a mathematician, a great author's son of being a writer, a great artist's son of being skillful in art, a great philosopher's son of taking philosophic views of things. Nearly every son looks forward while still young to the time when he shall be doing his father'swork; nearly every father hopes, while his children are yet young, that some at least among them will follow his pursuits. The fact that so few sons of great men do follow in their fathers' footsteps shows that, despite the strong ambition of the son and the anxious hope of the father, the son, in the majority of instances, has not had ability even to take a fairly good position in the work wherein the father has been, perhaps, pre-eminently distinguished.

I have said that certain mental qualities have certainly been transmitted in some cases. Galton mentions one noteworthy instance relating to memory. In the family of Porson good memory was so notable a faculty as to give rise to the byword, "the Porson memory." Lady Hester Stanhope, says the late F. Papillon, "she whose life was so full of adventure, gives, as one among many points of resemblance between herself and her grandfather, her retentive memory. 'I have my grandfather's grey eyes,' she said, 'and his memory of places. If he saw a stone on the road, he remembered it; it is the same with myself. His eye, which was ordinarily dull and lusterless, was lighted up, like my own, with a dull gleam

whenever he was seized with passion.'"

In endeavoring to form an opinion on the law of heredity in its relation to genius, we must remember that a remark somewhat similar to one made by Huxley respecting the origin of new species applies to the origin of a man of genius. Before such a man became celebrated no one cared particularly to inquire about his ancestry or relations; when his fame was established, the time for making the inquiry had passed away. It is quite possible that, if we had exact and full information, in a great number of cases we might find the position taken up by Mr. Galton and M. Ribot greatly strengthened; it is, however, also possible that we might find it much weakened, not only by the recognition of a multitude of cases in which the approach of a great man was in no sort indicated by scintillations of brightness along the genealogical track, but by a yet greater number of cases in which families containing numbers of clever, witty and learned folks have produced none who attained real distinction.

There is an excellent remark in a thoughtful but anonymous paper on Heredity in the *Quarterly Journal of Science*, two years or so ago, which suggests some considerations well worth noting. "If we look," says the writer, "on the intellect as not a single force but a complex of faculties, we shall find little to perplex us in the phenomenon of spontaneity" —that is (in this case), in the appearance of a man of genius in a family not before remarkable in any way. "Suppose a family who have possessed some of the attributes of greatness, but who, in virtue of a principle equally true in psychology and in mechanics, that 'nothing is stronger than its weakest part,' has remained in obscurity. Let a man of this family marry a woman whose faculties are the complement of his own. It is possible that a child of such a couple may combine the defects or weaknesses of both parents, and we have then the case of spontaneous imbecility or criminality. But it is also possible that he may combine the excellences of both, and burst upon the world as a spontaneous genius. . . . Again, we must remember that, even if we consider the intellect as 'one and indivisible,' it is far from being the only faculty needful for the attainment of excellence, even in the fields of pure science. Combined with it there must be the moral faculties of patience, perseverance, and concentration. The will must be strong enough to overcome all distracting temptations, whether in themselves good or evil. Lastly, there must be constitutional energy and endurance. Failing these, the man will merely leave among his friends the conviction that he might have achieved greatness, if ——. We once knew a physician, resident in a small country town, who from time to time startled his associates by some profound and suggestive idea, some brilliant *apercu*. But a constitutional languor prevented him from ever completing an investigation, or from leaving the world one written line."

The effect of circumstances also must not be overlooked. It is certain that some of those who stand highest in the world's repute would have done nothing to make their names remembered but for circumstances which either aided their efforts or compelled them to exertion; and it cannot be doubted, therefore, that many who have been by no means celebrated have required but favoring opportunities or the spur of adverse circumstances to have achieved distinction. We note the cases in which men who have been intended by their parents for the desk or routine work have fortunately been freed for nobler work, to which their powers have specially fitted them. But we are apt to forget that for each such case there must be many instances in which no fortunate chance has intervened. The theory that genius *will* make its way, despite all obstacles, is

like the popular notion that "murder will out," and other such fancies. We note when events happen which favor such notions, but we not only do not note—in the very nature of things it is impossible that we should have the chance of noting—cases unfavorable to a notion which, after all, is but a part of the general and altogether erroneous idea that what we think ought to be, will be. That among millions of men in a civilized community, trained under multitudinous conditions, for diverse professions, trades, and so forth, exposed to many vicissitudes of fortune, good and bad, there should be men from time to time

> Who break their birth's invidious bar,
> And grasp the skirts of happy chance,
> And breast the blows of circumstance,
> And grapple with their evil star,

is no truer proof of the general theory that genius will make its mark, despite circumstance, than is the occasional occurrence of strange instances in which murder has been detected despite seemingly perfect precautions.

It must, however, be in a general sense admitted that mental powers, like bodily powers, are inherited. If the ancestry of men of genius could be traced, we should in each case probably find enough, in the history of some line at least along which descent could be traced, to account for the possession of special powers, and enough in the history of that and other lines of descent to account for the other qualities or characteristics which, combined with those special powers, gave to the man's whole nature the capacity by which he was enabled to stand above the average level of his fellow-men. We might, with knowledge at once wider and deeper than we actually possess of the various families of each nation, and their relationships, predict in many cases, not that any given child would prove a genius, but that some one or other of a family would probably rise to distinction. To predict the advent of a man of great genius as we predict the approach of an eclipse or a transit, will doubtless never be in men's power; but it is conceivable that at some perhaps not very remote epoch, anticipations may be formed somewhat like those which astronomers are able to make respecting the recurrence of meteoric showers at particular times and seasons, and visible in particular regions. Already we know so much as this, that in certain races of men only can special forms of mental energy, like special bodily characteristics, be expected to appear. It may well be that hereafter such anticipations may be limited to special groups of families.

When we pass from mental to moral qualities we find ourselves in the presence of problems which could not be thoroughly dealt with in these pages. The general question, how far the moral characteristics of each person born into the world depends on those of the parents, or more generally of the ancestry, is one involving many considerations which, perhaps unfortunately, have been associated with religious questions. And apart from this, the answers to this question have been found to have a very wide range—from the opinion of those who (like Miss Martineau) consider that our characters, even where they seem to undergo changes resulting from the exercise of will, are entirely due to inheritance, to the view of those who consider, like Heinroth, that no moral characteristic can possibly be regarded as inherited in such sort as to modify either responsibility for evil-doing or credit for well-doing. Probably most will be content to accept a view between these extremes, without too nicely considering how far moral responsibility is affected by the influence of inherited tendencies.

There are, however, some illustrations relating to exceptional habits, which may be mentioned here without bringing in the general question.

I have not referred to insanity in speaking of inherited mental qualities, because insanity must be regarded as

a disease of the moral rather than of the mental nature. Its origin may be in the mind, as the origin of mental diseases is in the brain, that is, is in the body; but the principal manifestations of insanity, those which must guide us in determining its true position, are unquestionably those relating to moral habitudes. Insanity is not always, or at least not always demonstrably, hereditary. Esquirol found among 1,375 lunatics 337 unquestionable cases of hereditary transmission. Guislain and others regard hereditary lunacy as including, roughly, one-fourth of the cases of insanity. Moreau and others hold that the proportion is greater. It appears, however, that mental alienation is not the only form in which the insanity of an ancestor may manifest itself. Dr. Morel gives the following instructive illustration of the "varied and odd complications occurring in the hereditary transmissions of nervous disease." He attended four brothers belonging to one family. The grandfather of these children had died insane; their father had never been able to continue long at anything; their uncle, a man of great intellect and a distinguished physican, was noted for his eccentricities. Now, these four children, sprung from one stock, presented very different forms of physical disorder. One of them was a maniac, whose wild paroxysms occurred periodically. The disorder of the second was melancholy madness; he was reduced by his stupor to a merely automatic condition. The third was characterized by an extreme irascibility and suicidal disposition. The fourth manifested a strong liking for art; but he was of a timorous and suspicious nature. This story seems, in some degree, to give support to the theory that genius and mental aberration are not altogether alien; that, in fact,

> Great wit to madness nearly is allied,
> And thin partitions do their bounds divide.

Of the hereditary transmission of idiotcy we naturally have not the same kind of evidence. Madness often, if not generally, comes on or shows itself late in life, whereas idiotcy is not often developed in the adult. Insanity is the diseased or weakened condition of a mind possessing all the ordinary thinking faculties; idiotcy implies that some of these faculties are altogether wanting. It has been asserted, by the way, that idiotcy is a production of civilization. The civilized "present, as peoples," says Dr. Duncan, "indications of defective vital force, which are not witnessed among those human beings that live in a state of nature. There must be something rotten in some parts of our boasted civilization: and not only a something which has to do with our psychology, but a great deal more with our power of physical persistence. It is a fact that the type of the perfect minded, just above the highest idiots, or the simpletons, is more distinguishable amongst the most civilized of the civilized than among those who are the so-called children of nature. Dolts, boobies, stupids, *et hoc genus omne*, abound in young Saxondom; but their representatives are rare amongst the tribes that are slowly disappearing before the white man." But it seems barely possible that the difference may be due to the care with which civilized communities interfere to prevent the elimination of idiot infants by the summary process of destroying them. The writer from whom I have just quoted refers to the fact that, even under the Roman Empire, as during the Republic, idiots were looked upon as "useless entities by the practical Roman." They had no sanctity in his eyes, and hence their probable rarity; doubtless the unfortunate children were neglected, and there is much reason for believing that they were "exposed." "A congenital idiot soon begins to give trouble," proceeds Dr. Duncan, "and to excite unusual attention; and, moreover, unless extra care is given to it, death is sure to ensue in early childhood." May not

idiot children in savage communities have an even worse chance of survival than under the Roman Empire? and may not dolts, boobies, and stupids, *et hoc genus omne*, among savages, have such inferior chances in the infantine and later in the adult struggle for existence, that we may explain thus the comparative rarity of these varieties in savage communities? It certainly does not seem to have been proved as yet that civilization *per se* is favorable to the development of insanity.

The liking for strong drink, as is too well known, is often transmitted. It is remarked by Dr. Howe that "the children of drunkards are deficient in bodily and vital energy, and are predisposed by their very organization to have cravings for alcoholic stimulants. If they pursue the course of their fathers, which they have more temptation to follow and less power to avoid than the children of the temperate, they add to their hereditary weakness, and increase the tendency to idiotcy or insanity in their constitution; and this they leave to their children after them." Whatever opinion we may form on the general question of responsibility for offences of commission or of omission, on this special point all who are acquainted with the facts must agree, admitting that, in some cases of inherited craving for alcoholic stimulants, the responsibility of those who have failed and fallen in the struggle has been but small. "The fathers have eaten sour grapes, and the children's teeth are set on edge." Robert Collyer, of Chicago, in his noble sermon "The Thorn in the Flesh" has well said: "In the far-reaching influences that go to every life, and away backward as certainly as forward, children are sometimes born with appetites fatally strong in their nature. As they grow up the appetite grows with them, and speedily becomes a master, the master a tyrant; and by the time he arrives at manhood, the man is a slave. I heard a man say that for eight-and-twenty years the soul within him had had to stand like an unsleeping sentinel, guarding his appetite for strong drink. To be a man at last under such a disadvantage, not to mention a saint, is as fine a piece of grace as can well be seen. There is no doctrine that demands a larger vision than this of the depravity of human nature. Old Dr. Mason used to say that 'as much grace as would make John a saint, would hardly keep Peter from knocking a man down.'"

There are some curious stories of special vices transmitted from parent to child, which, if true, are exceedingly significant, to say the least.* Gama Machado relates that a lady with whom he was acquainted, who possessed a large fortune, had a passion for gambling and passed whole nights at play. "She died young," he proceeds; "of a pulmonary complaint. Her eldest son, who was in appearance the image of his mother, had the same passion for play. He died of consumption like his mother, and at the same age; his daughter, who resembled him, inherited the same tastes and died young." Hereditery predisposition to theft, mur-

* The following statement from the researches of Brown-Sequard seems well worth noting in this connection: "In the course of his masterly experimental investigations into the functions of the nervous system he discovered that, after a particular lesion of the spinal cord of guinea-pigs, a slight pinching of the skin of the face would throw the animal into a kind of epileptic convulsion. That this artificial epilepsy should be constantly producible in guinea-pigs, and not in any other animals experimented on, was in itself sufficiently singular; and it was not less surprising that the tendency to it persisted after the lesion of the spinal cord seemed to have been entirely recovered from. But it was far more wonderful that the offspring of these epileptic guinea-pigs showed the same predisposition without having been themselves subjected to any lesion whatever; whilst no such tendency showed itself in any of the large number of young bred by the same accurate observer from parents that had not thus been operated on."

der and suicide, has been demonstrated in several cases. But the world at large is naturally indisposed to recognise congenital tendency to crime as largely diminishing responsibility for offences or attempted offences of this kind. So far as the general interests of the community are concerned, the demonstrated fact that a thief or murderer has *inherited* his unpleasant tendency should be a *raison de plus* for preventing the tendency from being transmitted any farther. In stamping out the hereditary ruffian or rascal by life imprisonment, we not only get rid of the "grown serpent," but of the worm which

> Hath nature that in time would venom breed.

An illustration of the policy at least (we do not say the justice) of preventive measures in such cases, is shown in the case of a woman in America, of whom the world may fairly say what Father Paul remarked to gentle Alice Brown, it "never knew so criminal a family as hers." A young woman of remarkably depraved character infested, some seventy years since, the district of the Upper Hudson. At one stage of her youth she narrowly, and somewhat unfortunately, escaped death. Surviving, however, she bore many children, who in turn had large families, insomuch that there are now some eighty direct descendants, of whom one-fourth are convicted criminals, whilst the rest are drunkards, lunatics, paupers, and otherwise undesirable members of the community.

With facts such as these before us, we cannot doubt that in whatever degree variability may eliminate after awhile peculiar mental or moral tendencies, these are often transmitted for many generations before they die out. If it be unsafe to argue that the responsibility of those inheriting special characteristics is diminished, the duties of others towards them may justly be considered to be modified. Other duties than the mere personal control of tendencies which men may recognize in themselves are also introduced. If a man finds within himself an inherent tendency towards some sin, which yet he utterly detests, insomuch that while the spirit is willing the flesh is weak, or perchance utterly powerless, he must recognize in his own life a struggle too painful and too hopeless to be handed down to others. As regards our relations to families in which criminal tendencies have been developed, either through the negligence of those around (as in certain dens in London where, for centuries, crime has swarmed and multiplied), or by unfortunate alliances, we may "perceive here a divided duty." It has been remarked that "we do not set ourselves to train tigers and wolves into peaceful domestic animals; we seek to extirpate them," and the question has been asked, "why should we act otherwise with beings, who, if human in form, are worse than wild beasts?" "To educate the son of a garroter or 'corner-man' into an average Englishman" may be "about as promising a task as to train one of the latter into a Newton or a Milton." But we must not too quickly despair of a task which may be regarded as a duty inherited from those who in past generations neglected it.

There is no hope of the reversion of tiger or wolf to less savage types, for, far back as we can trace their ancestry, we find them savage of nature. With our criminal families the case is not so utterly hopeless. Extirpation being impossible (though easily talked of) without injustice, which would be the parent of far greater troubles even than our criminal classes bring upon us, we should consider the elements of hope which the problem undoubtedly affords. By making it the manifest interest of our criminal population to scatter, or, failing that, by leaving them no choice in the matter, the poison in their blood may before many generations be eradicated, not by wide-spreading merely, but because of the circumstance that only the better sort among them would have (when scattered) much chance of rearing families as well as of escaping imprisonment.

II.

ARTIFICIAL SOMNAMBULISM.

Rather more than a quarter of a century ago, two Americans visited London, who called themselves professors of Electro-Biology, and claimed the power of "subjugating the most determined wills, paralyzing the strongest muscles, preventing the evidence of the senses, destroying the memory of the most familiar events or of the most recent occurrences, inducing obedience to any command, and making an individual believe himself transformed into any one else." All this and more was to be effected, they said, by the action of a small disc of zinc and copper held in the hand of the "subject," and steadily gazed at by him, "so as to concentrate the electro-magnetic action." The pretensions of these professors received before long a shock as decisive as that which overthrew the credit of the professors of animal magnetism when Haygarth and Falconer successfully substituted wooden tractors for the metallic tractors which had been supposed to convey the magnetic fluid. In 1851, Mr. Braid, a Scotch surgeon, who had witnessed some of the exhibitions of the electro-biologists, conceived the idea that the phenomena were not due to any special qualities possessed by the discs of zinc and copper, but simply to the fixed look of the "subject" and the entire abstraction of his attention. The same explanation applied to the so-called "magnetic passes" of the mesmerists. The monotonous manipulation of the operator produced the same effect as the fixed stare of the "subject." He showed by his experiments that no magnetizer, with his imaginary secret agents or fluids, is in the least wanted; but that the subjects can place themselves in the same condition as the supposed subjects of electro-biological influences by simply gazing fixedly at some object for a long time with fixed attention.

The condition thus superinduced is not hypnotism, or artificial somnambulism, properly so called. "The electro-biological" condition may be regarded as simply a kind of reverie or abstraction artificially produced. But Braid discovered that a more perfect control might be obtained over "subjects," and a condition resembling that of the sleep-walker artificially induced, by modifying the method of fixing the attention. Instead of directing the subject's gaze upon a bright object, placed at a considerable distance from the eyes, so that no effect was required to concentrate vision upon it, he placed a bright object somewhat above and in front of the eyes at so short a distance that the convergence of their axes upon it was accompanied with sufficient effect to produce even a slight amount of pain. The condition to which the "subjects" of this new method were reduced was markedly different from the ordinary "electro-biological" state. Thus on one occasion, in the presence of 800 persons, fourteen men were experimented upon. "All began the experiment at the same time; the former with their eyes fixed upon a projecting cork, placed securely on their foreheads; the others at their own will gazed steadily at certain points in the direction of the audience. In the course of ten minutes the eyelids of these ten persons had involuntarily closed. With some, consciousness remained; others were in catalepsy, and entirely insensible to being stuck with needles; and others on awakening knew absolutely nothing of what had taken place during their sleep." The other four simply passed into the ordinary condition of electro-biologized "subjects," retaining the recollection of all that happened to them while in the state of artificial abstraction or reverie.

Dr. Carpenter, in that most interesting work of his, "Mental Physiology," thus describes the state of hypnotism: "The process is of the same kind as that employed for the induction of the 'biological' state, the only difference lying in the *greater*

intensity of the gaze, and in the more complete concentration of will upon the direction of the eyes, which the nearer approximation of the object requires for the maintenance of the convergence. In hypnotism, as in ordinary somnambulism, no remembrance whatever is preserved in the waking state of anything that may have occurred during its continuance; although the previous train of thought may be taken up and continued uninterruptedly on the next occasion that the hypnotism is induced. And when the mind is not excited to activity by the stimulus of external impressions, the hypnotized subject appears to be profoundly asleep; a state of torpor, in fact, being usually the first result of the process, and any subsequent manifestation of activity being procurable only by the prompting of the operator. The hypnotized subject, too, rarely opens his eyes; his bodily movements are usually slow; his mental operations require a considerable time in their performance; and there is altogether an appearance of heaviness about him, which contrasts strongly wtih the comparatively wide-awake air of him who has not passed beyond the ordinary 'biological' state."

We must note, however, in passing, that the condition of complete hypnotism had been obtained in several instances by some of the earlier experimenters in animal magnetism. One remarkable instance was communicated to the surgical section of the French Academy on April 16, 1829, by Jules Cloquet. Two meetings were entirely devoted to its investigation. The following account presents all the chief points of the case, surgical details being entirely omitted, however, as not necessary for our present purpose: A lady, aged sixty-four, consulted M. Cloquet on April 8, 1829, on account of an ulcerated cancer of the right breast, which had continued gradually growing worse, during several years. M. Chapelain, the physician attending the lady, had "magnetized" her for some months, producing no remedial effects, but only a very profound sleep or torpor, during which all sensibility seemed to be annihilated, while the ideas retained all their clearness. He proposed to M. Cloquet to operate upon her while she was in this state of torpor, and the latter, considering the operation the only means of saving her life, consented. The two doctors do not appear to have been troubled by any scruples as to their right thus to conduct an operation to which, when in her normal condition, the patient strenuously objected. It sufficed for them that when they had put her to sleep artificially, she could be persuaded to submit to it. On the appointed day M. Cloquet found the patient ready "dressed and seated in an elbow-chair, in the attitude of a person enjoying a quiet, natural sleep." In reality, however, she was in the somnambulistic state, and talked calmly of the operation. During the whole time that the operation lasted—from ten to twelve minutes—she continued to converse quietly with M. Cloquet, "and did not exhibit the slightest sign of sensibility. There was no motion of the limbs or of the features, no change in the respiration nor in the voice; no motions even in the pulse. The patient continued in the same state of automatic indifference and impassibility in which she had been some minutes before the operation." For forty-eight hours after this, the patient remained in the somnambulistic state, showing no sign of pain during the subsequent dressing of the wound. When awakened from this prolonged sleep she had no recollection of what had passed in the interval; "but on being informed of the operation, and seeing her children around her, she experienced a very lively emotion, which the 'magnetiser' checked by immediately setting her asleep." Certainly none of the hypnotized "subjects" of Mr. Braid's experiments showed more complete abstraction from their normal condition than this lady; and other cases cited in Bertrand's work,

"Le Magnétisme Animal en France" (1826), are almost equally remarkable. As it does not appear that in any of these cases Braid's method of producing hypnotism by causing the eyes, or rather their optical axes, to be converged upon a point, was adopted, we must conclude that this part of the method is not absolutely essential to success. Indeed, the circumstance that in some of Braid's public experiments numbers of the audience became hypnotized without his knowledge, shows that the more susceptible "subjects" do not require to contemplate a point near and slightly above the eyes, but may be put into the true hypnotic state by methods which, with the less susceptible, produce only the electro-biological condition.

It will be well, however, to inquire somewhat carefully into this point. My present object, I would note, is not merely to indicate the remarkable nature of the phenomena of hypnotism, but to consider these phenomena with direct reference to their probable cause. It may not be possible to obtain a satisfactory explanation of them. But it is better to view them as phenomena to be accounted for than merely as surprising but utterly inexplicable circumstances.

Now we have fortunately the means of determining the effect of the physical relations involved in these experiments, apart from those which are chiefly due to imagination. For animals can be hypnotised, and the conditions necessary for this effect to be fully produced have been ascertained.

The most familiar experiment of this sort is sometimes known as Kircher's. Let the feet of a hen be tied together (though this is not necessary in all cases), and the hen placed on a level surface. Then, if the body of the hen is gently pressed down, the head extended, with the beak pointing downwards, touching the surface on which the hen stands, and a chalk mark is drawn slowly along the surface, from the tip of the beak in a line extending directly from the bird's eye, it is found that the hen will remain for a considerable time perfectly still, though left quite free to move. She is, in fact, hypnotized.

We have now to inquire what parts of the process just described are effective in producing the hypnotic condition, or whether all are essential to success in the experiment.

In the first place, the fastening of the feet may be dispensed with. But it has its influence, and makes the experiment easier. An explanation, or rather an illustration, of its effect is afforded by a singular and interesting experiment devised by Lewissohn, of Berlin: If a frog is placed on its back, it immediately, when the hand which had held it is removed, turns over and escapes. But if the two fore legs are tied with a string, the frog, when placed on its back, breathes heavily, but is otherwise quite motionless, and does not make the least attempt to escape, even when the experimenter tries to move it. "It is as though," says Czermak, describing the experiment as performed by himself, "its small amount of reasoning power had been charmed away, or else that it slept with open eyes. Now I press upon the cutaneous nerves of the frog, while I loosen and remove the threads on the fore legs. Still the animal remains motionless upon its back, in consequence of some remaining after-effect; at last, however, it returns to itself, turns over and quickly escapes."

Thus far the idea suggested is that the animal is so affected by the cutaneous pressure as to suppose itself tied and therefore unable to move. In other words, this experiment suggests that imagination acts on animals as on men, only in a different degree. I may cite here a curious case which I once noticed and have never been able to understand, though it seems to suggest the influence of imagination on an animal one would hardly suspect of being at all under the influence of any but purely physical influences. Hearing a noise as of a cat leaping down from a pantry

window, which looked out on an enclosed yard, I went directly into the yard, and there saw a strange cat running off with a fish she had stolen. She was at the moment leaping on to a bin, from the top of which, by another very easy leap, she could get on to the wall enclosing the yard, and so escape. With the idea rather of frightening her than hurting her (does one missile out of a hundred flung at cats ever hit them?), I threw at the thief a small piece of wood which I had in my hand at the moment. It struck the wall above her just as she was going to leap to the top of the wall, and it fell, without touching her, between her and the wall. To my surprise, she stood perfectly still, looking at the piece of wood, her mouth, from which the fish had fallen, remaining open, and her whole attitude expressing stupid wonder. I make no doubt I could have taken her prisoner, or struck her heavily, if I had wished, for she made no effort to escape until, with a parlor broom which stood by, I pushed her long the top of the bin toward the wall, when she seemed suddenly to arouse herself, and leaping to the top of the wall, she made off. My wife witnessed the last scene of this curious little comedy. In fact, it was chiefly, perhaps, because she pleaded for mercy on "the poor thing" that the soft end of the broom alone came into operation; for, though not altogether agreeing with the Count of Roussillon that anything can be endured before a cat, I did not at the moment regard that particular cat with special favor.

The extension of the neck and depression of the head in the experiment with the hen have no special significance, for Czermak has been able to produce the same phenomena of hypnotism without them, and has failed to produce the hypnotic effect on pigeons when attending to this point, and in other respects proceeding as nearly as possible in the same way as with hens. "With the hens," he says, "I often hung a piece of twine, or a small piece of wood, directly over their crests, so that the end fell before their eyes. The hens not only remained perfectly motionless, but closed their eyes, and slept with their heads sinking until they came in contact with the table. Before falling asleep, the hens' heads can be either pressed down or raised up, and they will remain in this position as if they were pieces of wax. That is, however, a symptom of a cataleptic condition, such as is seen in human beings under certain pathological conditions of the nervous system."

On the other hand, repeated experiments convinced Czermak that the pressure on the animal as it is held is of primary importance. It is frequently the case, he says, that a hen, which for a minute has been in a motionless state, caused by simply extending the neck and depressing the head, awakes and flies away, but on being caught again immediately, she can be placed once more in the condition of lethargy, if we place the animal in a squatting position, and overcome with gentle force the resistance of the muscles, by firmly placing the hand upon its back. During the slow and measured suppression, one often perceives an extremely remarkable position of the head and neck, which are left entirely free. The head remains as if held by an invisible hand in its proper place, the neck being stretched out of proportion, while the body by degrees is pushed downwards. If the animal is thus left entirely free, it remains for a minute or so in this peculiar condition with wide-open staring-eyes. "Here," as Czermak remarks, "the actual circumstances are only the effect of the emotion which the nerves of the skin excite, and the gentle force which overcomes the animal's resistance. Certainly the creature a short time before had been in a condition of immobility, and might have retained some special inclination to fall back into the same, although the awakening, flight, and recapture, together with the refreshment given to the nervous system, are

intermediate circumstances." Similar experiments are best made upon small birds. Now, it is well known to bird-fanciers that goldfinches, canary-birds, etc., can be made to remain motionless for some time by simply holding them firmly for a moment and then letting them go. "Here, in my hand," said Czermak, in his lecture, "is a timid bird, just brought from market. If I place it on its back, and hold its head with my left hand, keeping it still for a few seconds, it will lie perfectly motionless after I have removed my hands, as if charmed, breathing heavily, and without making any attempt to change its position or to fly away." ("Two of the birds," says the report, "were treated in this manner without effect; but the third, a siskin, fell into a sleeping condition, and remained completely immovable on its back, until pushed with a glass tube, when it awoke and flew actively around the room.")

Also when a bird is in a sitting position, and the head is pressed slightly back, the bird falls into a sleeping condition, even though the eyes had been open. "I have often noticed," says Czermak, "that the birds under these circumstances close their eyes for a few minutes or even a quarter of an hour, and are more or less fast asleep."

Lastly, as to the chalk-line in Kircher's experiment. Czermak found, as already said, that pigeons do not become motionless, as happens to hens, if merely held firmly in the hand, and their heads and necks pressed gently on the table. Nor can they be hypnotized like small birds in the experiment last mentioned. "That is," he says, "I held them with a thumb placed on each side of the head, which I bent over a little, while the other hand held the body gently pressed down upon the table; but even this treatment, which has such an effect on little birds, did not seem to succeed at first with the pigeons; almost always they flew away as soon as I liberated them and entirely removed my hands." But he presently noticed that the short time during which the pigeons remained quiet lengthened considerably when the finger only of the hand which held the head was removed. Removing the hand holding the body made no difference, but retaining the other hand near the bird's head, the hand made all the difference in the world. Pursuing the line of research thus indicated, Czermak found to his astonishment that the fixing of the pigeon's look on the finger placed before its eyes was the secret of the matter. In order to determine the question still more clearly, he tried the experiment on a pigeon which he had clasped firmly by the body in his left hand, but whose neck and head were perfectly free. "I held one finger of my right hand steadily before the top of its beak—and what did I see? The first pigeon with which I made this attempt remained rigid and motionless, as if bound, for several minutes, before the outstretched finger of my right hand! Yes, I could take my left hand, with which I had held the bird, and again touch the pigeon without waking it up; the animal remained in the same position while I held my outstretched finger still pointing towards the beak." "The lecturer," says the report, "demonstrated this experiment in the most successful manner with a pigeon which was brought to him."

Yet it is to be noticed that among animals, as among men, different degrees of subjectivity exist. "Individual inward relations," says Czermak, "as well as outward conditions, must necessarily exercise some disturbing influence, whether the animal will give itself up to the requisite exertions of certain parts of its brain with more or less inclination or otherwise. We often see, for example, that a pigeon endeavors to escape from confinement by a quick turning of its head from side to side. In following those singular and characteristic movements of the head and neck, with the finger held before the bird, one either gains his point, or else makes the pigeon so perplexed and excited that it at last

becomes quiet, so that, if it is held firmly by the body and head, it can be forced gently down upon the table. As Schopenhauer says of sleeping, "The brain must bite." I will also mention here, by the way, that a tame parrot, which I have in my house, can be placed in this sleepy condition by simply holding the finger steadily before the top of its beak."

I may cite here a singular illustration of the effect of perplexity in the case of a creature in all other respects much more naturally circumstanced than the hens, pigeons, and small birds of Czermak's experiments. In the Spring of 1859, when I was an undergraduate at Cambridge, I and a friend of mine were in canoes on the part of the Cam which flow through the College grounds. Here there are many ducks and a few swans. It occurred to us, not, I fear, from any special scientific spirit, but as a matter of curiosity, to inquire whether it was possible to pass over a duck in a canoe. Of course on the approach of either canoe a duck would try to get out of the way on one side or the other; but on the course of the canoe being rapidly changed, the duck would have to change his course. Then the canoe's course would again be changed, so as to compel the duck to try the other side. The canoe drawing all the time nearer, and her changes of course being made very lightly and in quicker and quicker alteration as she approached, the duck would generally get bewildered, and finally would allow the canoe to pass over him, gently pressing him under water in its course. The process, in fact, was a sort of mild keel-hauling. The absolute rigidity of body and the dull stupid stare with which some of the ducks met their fate seems to me (*now:* I was not in 1859 familiar with the phenomena of hypnotism) to suggest that the effect was to be explained as Czermak explains the hypnotism of the pigeons on which he experimented.

We shall be better able now to understand the phenomena of artificial somnambulism in the case of human beings. If the circumstances observed by Kircher, Czermak, Lewissohn, and others suggest, as I think they do, that 'animal hypnotism is a form of the phenomenon sometimes called fascination, we may be led to regard the possibility of artificial somnambulism in men as a survival of a property playing in all probability an important and valuable part in the economy of animal life. It is in this direction, at present, that the evidence seems to tend.

The most remarkable circumstance about the completely hypnotized subject is the seemingly complete control of the will of the "subject" and even of his opinions. Even the mere suggestions of the operator, not expressed verbally or by signs, but by movements imparted to the body of the subject, are at once responded to, as though, to use Dr. Garth Wilkinson's expression, the *whole man* were given to each perception. Then, "if the hand be placed," says Dr. Carpenter, "upon the top of the head, the somnambulist will frequently, of his own accord, draw up his body to its fullest height, and throw his head slightly back; his countenance then assumes an expression of the most lofty pride, and his whole mind is obviously possessed by that feeling. When the first action does not of itself call forth the rest, it is sufficient for the operator to straighten the legs and spine, and to throw the head somewhat back, to arouse that feeling and the corresponding expression to its fullest intensity. During the most complete domination of this emotion, let the head be bent forward, and the body and limbs gently flexed; and the most profound humility then instantaneously takes its place." Of course in some cases we may well believe that the expressions thus described by Dr. Carpenter have been simulated by the subject. But there can be no reason to doubt the reality of the operator's control in many cases. Dr. Carpenter says that he has not only been an eye-witness of them on various occasions, but that

he places full reliance on the testimony of an intelligent friend, who submitted himself to Mr. Braid's manipulations, but retained sufficient self-consciousness and voluntary power to endeavor to exercise some resistance to their influence at the time, and subsequently to retrace his course of thought and feeling. "This gentleman declares," says Dr. Carpenter, "that, although accustomed to the study of character and to self-observation, he could not have conceived that the whole mental state should have undergone so instantaneous and complete a metamorphosis, as he remembers it to have done, when his head and body were bent forward in the attitude of humility, after having been drawn to their full height in that of self-esteem."

A most graphic description of the phenomena of hypnotism is given by Dr. Garth Wilkinson: "The preliminary state is that of abstraction, produced by fixed gaze upon some unexciting and empty thing (for poverty of object engenders abstraction), and this abstraction is the logical premiss of what follows. Abstraction tends to become more and more abstract, narrower and narrower; it tends to unity and afterwards to nullity. There, then, the patient is, at the summit of attention, with no object left, a mere statue of attention, a listening, expectant life; a perfectly undistracted faculty, dreaming of a lessening and lessening mathematical point; the end of his mind sharpened away to nothing. What happens? Any sensation that appeals is met by this brilliant attention, and receives its diamond glare; being perceived with a force of leisure of which our distracted life affords only the rudiments. External influences are sensated, sympathized with, to an extraordinary degree; harmonious music sways the body into graces the most affecting; discords jar it, as though they would tear it limb from limb. Cold and heat are perceived with similar exaltation; so also smells and touches. In short, *the whole man appears to be given to each perception.* The body trembles like down with the wafts of the atmosphere; the world plays upon it as upon a spiritual instrument finely attuned."

This state, which may be called the natural hypnotic state, may be artificially modified. "The power of suggestion over the patient," says Dr. Garth Wilkinson, "is excessive. If you say, 'What animal is it?' the patient will tell you it is a lamb, or a rabbit, or any other. 'Does he see it?' 'Yes.' 'What animal is it *now?*' putting depth and gloom into the tone of *now*, and thereby suggesting a difference. 'Oh!' with a shudder, 'it is a wolf.' 'What color is it?' still glooming the phrase. 'Black.' 'What color is it now?' giving the *now* a cheerful air. 'Oh! a beautiful blue!' (rather an unusual color for a wolf, I would suggest), spoken with the utmost delight (and no wonder! especially if the hypnotic subject were a naturalist). And so you lead the subject through any dreams you please, by variations of questions and of inflections of the voice! and *he sees and feels all as real.*"

We have seen how the patient's mind can be influenced by changing the posture of his body. Dr. Wilkinson gives very remarkable evidence on this point. "Double his fist and pull up his arm, if you dare," he says of the subject, "for you will have the strength of your ribs rudely tested. Put him on his knees and clasp his hands, and the saints and devotees of the artists will pale before the trueness of his devout actings. Raise his head while in prayer, and his lips pour forth exulting glorifications, as he sees heaven opened, and the majesty of God raising him to his place; then in a moment depress the head, and he is in dust and ashes, an unworthy sinner, with the pit of hell yawning at his feet. Or compress the forehead, so as to wrinkle it vertically, and thorny-toothed clouds contract in from the very horizon" (in the subject's imagination, it will be understood); "and what is

remarkable, the smallest pinch and wrinkle, such as will lie between your nipping nails, is sufficient nucleus to crystalize the man into that shape, and to make him all foreboding, as, again, the smallest expansion in a moment brings the opposite state, with a full breathing of delight."

Some will perhaps think the next instance the most remarkable of all, perfectly natural though one-half of the performance may have been. The subject being a young lady, the operator asks whether she or another is the prettier, raising her head as he puts the question. "Observe," says Dr. Wilkinson, "the inexpressible hauteur, and the puff sneers let off from the lips" (see Darwin's treatise on the "Expression of the Emotions," plate IV. 1, and plate V. 1), "which indicate a conclusion too certain to need utterance. Depress the head, and repeat the question, and mark the self-abasement with which she now says '*She is*,' as hardly worthy to make the comparison."

In this state, in fact, "whatever posture of any passion is induced, the passion comes into it at once, and dramatizes the body accordingly."

It might seem that there must of necessity be some degree of exaggeration in this description, simply because the power of adequately expressing any given emotion is not possessed by all. Some can in a moment bring any expression into the face, or even simulate at once the expression and the aspect of another person, while many persons, probably most, possess scarcely any power of the sort, and fail ridiculously even in attempting to reproduce the expressions corresponding to the commonest emotions. But it is abundantly clear that the hypnotized subject possesses for the time being abnormal powers. No doubt this is due to the circumstance that for the time being "the whole man is given to each perception." The stories illustrative of this peculiarity of the hypnotized state are so remarkable that they have been rejected as utterly incredible by many who are not acquainted with the amount of evidence we have upon this point.

The instances above cited by Dr. Garth Wilkinson, remarkable though they may be, are surpassed altogether in interest by a case which Dr. Carpenter mentions: of a factory girl whose musical powers had received little cultivation, and who could scarcely speak her own language correctly, who nevertheless exactly imitated both the words and the music of vocal performances by Jenny Lind. Dr. Carpenter was assured by witnesses in whom he could place implicit reliance, that this girl, in the hypnotized state, followed the Swedish nightingale's songs in different languages "so instantaneously and correctly, as to both words and music, that it was difficult to distinguish the two voices. In order to test the powers of the somnambulist to the utmost, Mademoiselle Lind extemporized a long and elaborate chromatic exercise, which the girl imitated with no less precision, though in her waking state she durst not even attempt anything of the sort."

The exaltation of the senses of hypnotized subjects is an equally wonderful phenomenon. Dr. Carpenter relates many very remarkable instances as occurring within his own experience. He has "known a youth, in the hypnotized state," he says, "to find out by the sense of smell, the owner of a glove which was placed in his hand from amongst a party of more than sixty persons, scenting at each of them one after the other until he came to the right individual. In another case, the owner of a ring was unhesitatingly found out from amongst a company of twelve, the ring having been withdrawn from the finger before the somnambule was introduced." The sense of touch has, in other cases, been singularly intensified, insomuch that slight differences of heat, which to ordinary feeling were quite inappreciable, would be at once detected, while such differences as can be but just per-

ceived in the ordinary state would produce intense distress.

In some respects the increase of muscular power, or rather of the power of special muscles, is even more striking, because it is commonly supposed by most persons that the muscular power depends entirely on the size and quality of the muscles, the state of health, and like conditions, not on the imagination. Of course every one knows that the muscles are capable of greater efforts when the mind is much excited by fear and other emotions. But the general idea is, I think, that whatever the body is capable of doing under circumstances of great excitement, it is in reality capable of doing at all times if only a resolute effort is made. Nor is it commonly supposed that a very wide difference exists between the greatest efforts of the body under excitement and those of which it is ordinarily capable. Now, the condition of the hypnotized subject is certainly not one of excitement. The attempts which he is directed to make are influenced only by the idea that he *can* do what he is told, not that he *must* do so. When a man pursued by a bull leaps over a wall, which, under ordinary conditions, he would not even think of climbing, we can understand that he only does because he must, what if he liked he could do at any time. But if a man who had been making his best efforts in jumping, cleared only a height of four feet, and presently being told to jump over an eight-feet wall, cleared the height with apparent ease, we should be disposed to regard the feat as savoring of the miraculous.

Now, Dr. Carpenter saw one of Mr. Braid's hypnotized subjects—a man so remarkable for the poverty of his physical development that he had not, for many years, ventured to lift up a weight of twenty pounds in his ordinary state—take up a quarter of a hundred weight upon his little finger, and swing it round his head with the utmost apparent ease, on being told that it was as light as a feather. "On another occasion he lifted a half hundred weight on the last joint of his forefinger as high as his knee." The personal character of the man placed him above all suspicion of deceit in the opinion of those who best knew him; and as Dr. Carpenter acutely remarks, "the impossibility of any trickery in such a case would be evident to the educated eye, since, if he had practiced such feats (which very few, even of the strongest men, could accomplish without practice), the effect would have made itself visible in his muscular development." "Consequently," he adds, "when the same individual afterwards declared himself unable, with the greatest effort, to lift a handkerchief from the table, after having been assured that he could not possibly move it, there was no reason for questioning the truth of his conviction, based as this was upon the same kind of suggestion as that by which he had been just before prompted to what seemed an otherwise impossible action."

The explanation of this and the preceding cases cannot be mistaken by physiologists, and is very important in its bearing on the phenomena of hypnotism generally, at once involving an interpretation of the whole series of phenomena, and suggesting other relations not as yet illustrated experimentally. It is well known that in our ordinary use of any muscles we employ but a small part of the muscle at any given moment. What the muscle is actually capable of is shown in convulsive contractions, in which far more force is put forth than the strongest effort of the will could call into play. We explain, then, the seeming increase of strength in any set of muscles during the hypnotic state as due to the concentration of the subject's will in an abnormal manner, or to an abnormal degree, on that set of muscles. In a similar way, the great increase of certain powers of perception may be explained as due to the concentration of the will upon the corresponding parts of the nervous system.

In like manner, the will may be directed so entirely to the operations necessary for the performances of difficult feats, that the hypnotized or somnambulistic subject may be able to accomplish what in his ordinary condition would be impossible or even utterly appalling to him. Thus sleep-walkers (whose condition precisely resembles that of the artificially hypnotized, except that the suggestions they experience come from contact with inanimate objects, instead of being aroused by the actions of another person) "can clamber walls and roofs, traverse narrow planks, step firmly along high parapets, and perform other feats which they would shrink from attempting in their waking state." This is simply, as Dr. Carpenter points out, because they are *not distracted* by the sense of danger which their vision would call up from concentrating their exclusive attention on the guidance afforded by their muscular sense."

But the most remarkable and suggestive of all the facts known respecting hypnotism is the influence which can by its means be brought to bear upon special parts or functions of the body. We know that imagination will hasten or retard certain processes commonly regarded as involuntary (indeed, the influence of imagination is itself in a great degree involuntary). We know further that in some cases imagination will do much more than this, as in the familiar cases of the disappearance of warts under the supposed influence of charms, the cure of scrofula at a touch, and hundreds of well-attested cases of so-called miraculous cures. But although the actual cases of the curative influence obtained over hypnotized patients may not be in reality more striking than some of these, yet they are more suggestive at any rate to ordinary minds, because they are known not to be the result of any charm or miraculous interference, but to be due to simply natural processes initiated by natural though unfamiliar means.

Take, for instance, such a case as the following, related by Dr. Carpenter (who has himself witnessed many remarkable cases of hypnotic cure): "A female relative of Mr. Braid's was the subject of a severe rheumatic fever, during the course of which the left eye became seriously implicated, so that after the inflammatory action had passed away, there was an opacity over more than one-half of the cornea, which not only prevented distinct vision, but occasioned an annoying disfigurement. Having placed herself under Mr. Braid's hypnotic treatment for the relief of violent pain in her arm and shoulder, she found, to the surprise alike of herself and Mr. Braid, that her sight began to improve very perceptibly. The operation was therefore continued daily; and in a very short time the cornea became so transparent that close inspection was required to discover any remains of the opacity." On this, Carpenter remarks that he has known other cases in which secretions that had been morbally suspended have been reinduced by this process; and is satisfied that, if applied with skill and discrimination, it would take rank as one of the most potent methods of treatment which the physician has at his command. He adds that "the channel of influence is obviously the system of nerves which regulates the secretions—nerves which, though not under direct subjection to the will, are peculiarly affected by emotional states."

I may remark, in passing, that nerves which are not ordinarily under the influence of the will, but whose office would be to direct muscular movements if only the will could influence them, may by persistent attention become obedient to the will. When I was last in New York, I met a gentleman who gave me a long and most interesting account of certain experiments which he had made on himself. The account was not forced on me, the reader must understand, but was elicited by questions suggested by one or two remarkable facts which he had casually

mentioned as falling within his experience. I had only his own word for much that he told me, and some may perhaps consider that there was very little truth in the narrative. I may pause here to make some remarks, by the way, on the traits of truthful and untruthful persons. I believe very slight powers of observation are necessary to detect want of veracity in any man, though absence of veracity in any particular story may not be easily detected or established. I am not one of those who believe every story they hear, and trust in every one they meet. But I have noticed one or two features by which the habitual teller of untruths may be detected very readily, as may also one who, without telling actual falsenoods, tries to heighten the effect of any story he may have to tell, by strengthening all the particulars. My experience in this respect is unlike Dickens's, who believed, and indeed found, that a man whom on first seeing he distrusted, and justly, could explain away the unfavorable impression. "My first impression," he says, "about such people, founded on face and manner alone, was invariably true; my mistake was in suffering them to come nearer to me and explain themselves away." I have found it otherwise, though, of course, Dickens was right about his own experience; the matter depends entirely on the idiosyncrasies of the observer. I have often been deceived by face and expression; never, to the best of my belief (and belief in this case is not mere opinion, but is based on results), by manner of speaking. One peculiarity I have never found wanting in habitually mendacious persons—a certain intonation which I cannot describe, but recognize in a moment, suggestive of the weighing of each sentence as it is being uttered, as though to consider how it would tell. Another is a peculiarity of manner, but it only shows itself during speech; it is a sort of watchfulness often disguised under a careless tone, but perfectly recognizable however disguised.

Now, the gentleman who gave me the experience I am about to relate conveyed to my mind, by every intonation of his voice and every peculiarity and change of manner, the idea of truthfulness. I cannot convey to others the impression thus conveyed to myself; nor do I expect that others will share my own confidence; I simply state the case as I know it, and as far as I know it. It will, however, be seen that a part of the evidence was confirmed on the spot.

The conversation turned on the curability of consumption. My informant, whom I will henceforth call A., said that, though he could not assert from experience that consumption was curable, he believed that in many cases where the tendency to consumption is inherited, and the consumptive constitution indicated so manifestly that under ordinary conditions the person would before long be hopelessly consumptive, an entire change may be made in the condition of the body, and the person become strong and healthy. He said: "I belong myself to a family many of whose members have died of consumption. My father and mother both died of it, and all my brothers and sisters save one brother; yet I do not look consumptive, do I?" And certainly he did not. He then took from a pocketbook a portrait of his brother, showing a young man manifestly in very bad health, looking worn, weary, and emaciated. From the same pocketbook A. then took another portrait, asking if I recognized it. I saw here again a worn and emaciated face and figure. The picture was utterly unlike the hearty, well-built man before me, yet it manifestly represented no other. If I had been at all doubtful, my doubts would have been removed by certain peculiarities to which A. called my attention. I asked how the change in his health had been brought about. He told me a very remarkable story of his treatment of himself, part of which I omit because I am satisfied he was mistaken in attributing to that portion of his self-

treatment any part of the good result which he had obtained, and that if many consumptive patients adopted the remedy, a large proportion, if not all, would inevitably succumb very quickly. The other portion of his account is all that concerns us here, being all that illustrates our present subject. He said: "I determined to exercise every muscle of my body; I set myself in front of a mirror and concentrated my attention and all the power of my will on the muscle or set of muscles I proposed to bring into action. Then I exercised those muscles in every way I could think of, continuing the process till I had used in succession every muscle over which the will has control. While carrying out this system, I noticed that gradually the will acquired power over muscles which before I had been quite unable to move. I may say, indeed, that every set of muscles recognized by anatomists, except those belonging to internal organs, gradually came under the control of my will." Here I interrupted, asking (not by any means as doubting his veracity, for I did not): "Can you do what Dundreary said he thought some fellow might be able to do—can you waggle your left ear?" "Why, certainly," he replied; and turning the left side of his head towards me, he moved his left ear about; not, it is true, waggling it, but drawing it up and down in a singular way, which was, he said, the only exercise he ever gave it. He said, on this, that there are many other muscles over which the will has ordinarily no control, but may be made to obtain control; and forthwith, drawing the cloth of his trousers rather tight round the thigh (so that the movement he was about to show might be discernible) he made in succession the three muscles of the front and inner side of the thigh rise about half an inch along some nine or ten inches of their length. Now, though these muscles are among those which are governed by the will, for they are used in a variety of movements, yet not one in ten thousand, perhaps in a million, can move them in the way described.

How far A.'s system of exciting the muscles individually as well as in groups may have operated in improving his health, as he supposed, I am not now inquiring. What I wish specially to notice is the influence which the will may be made to obtain over muscles ordinarily beyond its control. It may be that under the exceptional influence of the imagination, in the hypnotic condition, the will obtains a similar control for a while over even those parts of the nervous system which appertain to the so-called involuntary processes. In other words, the case I have cited may be regarded as occupying a sort of middle position between ordinary cases of muscular action and those perplexing cases in which the hypnotic subject seems able to influence pulsation, circulation, and processes of secretion in the various parts or organs of his body.

It must be noted, however, that the phenomena of hypnotism are due solely to the influence of the imagination. The quasi-scientific explanations which attributed them to magnetism, electricity, some subtle animal fluid, some occult force, and so forth, have been as completely negatived as the supernatural explanation. We have seen that painted wooden tractors were as effectual as the metal tractors of the earlier mesmerists; a small disc of card or wood is as effective as the disc of zinc and copper used by the electro-biologists; and now it appears that the mystical influence, or what was thought such, of the operator is no more essential to success than magnetic or electric apparatus.

Dr. Noble, of Manchester, made several experiments to determine this point. Some among them seem absolutely decisive.

Thus, a friend of Dr. Noble's had a female servant whom he had frequently thrown into the hypnotic state, trying a variety of experiments

many of which Dr. Noble had witnessed. Dr. Noble was at length told that his friend had succeeded in magnetizing her from another room and without her knowledge, with some other stories even more marvelous, circumstantially related by eye-witnesses, "amongst others by the medical attendant of the family, a most respectable and intelligent friend" of Dr. Noble's own. As he remained unsatisfied, Dr. Noble was invited to come and judge for himself, proposing whatever test he pleased. "Now had we visited the house," he says, "we should have felt dissatisfied with any result," knowing "that the presence of a visitor or the occurrence of anything unusual was sure to excite expectation of some mesmeric process." "We therefore proposed," he proceeds, "that the experiment should be carried on at our own residence; and it was made under the following circumstances: The gentleman early one evening wrote a note as if on business, directing it to ourselves. He thereupon summoned the female servant (the mesmeric subject), requesting her to convey the note to its destination, and to wait for an answer. The gentleman himself, in her hearing, ordered a cab, stating that if anyone called he was going to a place named, but was expected to return by a certain hour. Whilst the female servent was dressing for her errand, the master placed himself in the vehicle and rapidly arrived at our dwelling. In about ten minutes after the note arrived, the gentleman, in the meantime, being secreted in an adjoining apartment, we requested the young woman who had been shown into our study to take a seat whilst we wrote the answer; at the same time placing the chair with its back to the door leading into the next room, which was left ajar. It had been agreed that after the admission of the girl into the place where we were, the magnetizer, approaching the door in silence on the other side, should commence operations. There, then, was the patient or "subject" placed within two feet of her magnetizer, a door only intervening, and that but partially closed; but she, all the while, perfectly free from all idea of what was going on. We were careful to avoid any unnecessary conversation with the girl, or even to look towards her, lest we should raise some suspicion in her own mind. We wrote our letter (as if in answer) for nearly a quarter of an hour, once or twice only making an indifferent remark, and on leaving the room for a light to seal the supposed letter, we beckoned the operator away. No effect whatever had been produced, although we had been told that two or three minutes were sufficient, even when mesmerizing from the drawing-room, through walls and apartments, into the kitchen. In our own experiment the intervening distance has been very much less, and only one solid substance intervened, and that not completely; but here we suspect was the difference—*the "subject" was unconscious of the magnetism, and expected nothing.*"

In another case Dr. Noble tried the converse experiment with equally convincing results. Being in company one evening with a young lady said to be of high mesmeric susceptibility, he requested and received permission to test this quality in her. In one of the usual ways he "magnetized" her, and having so far satisfied himself, he "demagnetized" her. He next proceeded to "hypnotize" her, adopting Mr. Braid's method of directing the stare at a fixed point. "The result varied in no respect from that which had taken place in the foregoing experiment; the duration of the process was the same, and its intensity of effect neither greater nor less." "Dehypnotization" again restored the young lady to herself. "And now," says Dr. Noble, "we requested our patient to rest quietly at the fire-place, to think of just what she liked, and to look where she pleased, excepting at ourselves, who retreated behind her chair, saying that a new mode was about to be

tried, and that her turning round would disturb the process. We very composedly took up a volume which lay upon a table, and amused ourselves with it for about five minutes, when on raising our eyes, we could see by the excited features of other members of the party that the young lady was once more *magnetized*. We were informed by those who had attentively watched her during the progress of our little experiment, that all had been in every respect just as before. The lady herself, before she was undeceived, expressed a distinct consciousness of having *felt our unseen passes streaming down the neck*."

In a similar way, Mr. Bertrand, who was the first (Dr. Carpenter tells us) to undertake a really scientific investigation of the phenomena of mesmerism, proved that the supposed effect of a magnetized letter from him to a female somnambule was entirely the work of her own lively imagination. He magnetized a letter first, which on receipt was placed at his suggestion upon the epigastrium of the patient, who was thrown into the magnetic sleep with all the customary phenomena. He then wrote another letter, which he did not magnetize, and again the same effect was produced. Lastly he set about an experiment which should determine the real state of the case. "I asked one of my friends," he says, "to write a few lines in my place, and to strive to imitate my writing, so that those who should read the letter should mistake it for mine (I knew he could do so). He did this; our stratagem succeeded, and the sleep was produced just as it would have been by one of my own letters.

It is hardly necessary to say, perhaps, that none of the phenomena of hypnotism require, as indeed none of them, rightly understood, suggest, the action of any such occult forces as spiritualists believe in. On the other hand, I believe that many of the phenomena recorded by spiritualists as having occured under their actual observation are very readily to be explained as phenomena of hypnotism. Of course I would not for a moment deny that in the great majority of cases much grosser forms of deception are employed. But in others, and especially in those where the concentration of the attention for some time is a necessary preliminary to the exhibition of the phenomena (which suitable "subjects" only are privileged to see), I consider the resulting self-deception as hypnotic.

We may regard the phenomena of hypnotism in two aspects—first and chiefly as illustrating the influence of imagination on the functions of the body; secondly, as showing under what conditions the imagination may be most readily brought to bear in producing such influence. These phenomena deserve far closer and at the same time far wider attention than they have yet received. Doubt has been thrown upon them because they have been associated with false theories, and in many cases with fraud and delusion. But, rightly viewed, they are at once instructive and valuable. On the one hand they throw light on some of the most interesting problems of mental physiology; on the other they promise to afford valuable means of curing certain ailments, and of influencing in useful ways certain powers and functions of the body. All that is necessary, it should seem, to give hypnotic researches their full value, is that all association of those purely mental phenomena with charlatanry and fraud should be abruptly and definitely broken off. Those who make practical application of the phenomena of hypnotism should not only divest their own minds of all idea that some occult and as it were extra-natural force is at work, but should encourage no belief in such force in those on whom the hypnotic method is employed. Their influence on the patient will not be lessened, I believe, by the fullest knowledge on the patient's part that all which is to happen to him is purely natural—that, in fact, advantage is simply to be taken of an

observed property of the imagination to obtain an influence not otherwise attainable over the body as a whole (as when the so-called magnetic sleep is to be produced), or over special parts of the body. Whether advantage might not be taken of other than the curative influences of hypnotism is a question which will probably have occurred to some who may have followed the curious accounts given in the preceding pages. If special powers may be obtained, even for a short time, by the hypnotized subject, these powers might be systematically used for other purposes than mere experiment. If, again, the repetition of hypnotic curative processes eventually leads to a complete and lasting change in the condition of certain parts or organs of the body, the repetition of the exercise of special powers during the hypnotic state may after a while lead to the definite acquisition of such powers. As it now appears that the hypnotic control may be obtained without any effort on the part of the operator, the effort formerly supposed to be required being purely imaginary and the hypnotic state being in fact readily attainable without any operation whatever, we seem to recognize possibilities which, duly developed, might be found of extreme value to the human race. In fine, it would seem that man possesses a power which has hitherto lain almost entirely dormant, by which, under the influence of properly guided imagination, the will can be so concentrated on special actions that feats of strength, dexterity, artistic (and even perhaps scientific) skill may be accomplished by persons who, in the ordinary state, are quite incapable of such achievements.

III.

BODILY ILLNESS AS A MENTAL STIMULANT.

During special states of disease the mind sometimes develops faculties such as it does not possess when the body is in full health. Some of the abnormal qualities thus exhibited by the mind seem strikingly suggestive of the possible acquisition by the human race of similar powers under ordinary conditions. For this reason, though we fear there is no likelihood at present of any practical application of the knowledge we may obtain on this subject, it seems to me that there is considerable interest in examining the evidence afforded by the strange powers which the mind occasionally shows during diseases of the body, and especially during such diseases as are said, in unscientific but expressive language, to lower the tone of the nervous system.

We may begin by citing a case which seems exceedingly significant. Miss H. Martineau relates that a congenital idiot, who had lost his mother when he was less than two years old, when dying, "suddenly turned his head, looked bright and sensible, and exclaimed in a tone never heard from him before, 'Oh, my mother! how beautiful!' and sank down again—dead." Dr. Carpenter cites this as a case of abnormal memory, illustrating his thesis that the basis of recollection "may be laid at a very early period of life." But the story seems to contain a deeper meaning. The poor idiot not only recalled a long-past time, a face that he had not seen for years, except in dreams, but he gained for a moment a degree of intelligence which he had not possessed when in health. The quality of his brain was such, it appears, that with the ordinary activity of the circulation, the ordinary vitality of the organ, mental action was uncertain and feeble; but when the circulation had all but ceased, when the nervous powers were all but prostrate, the feeble brain, though it may have become no stronger actually, became relatively stronger, in such sort that for the time specified, a mere moment before dissolution, the idiot became an intelligent being.

A somewhat similar case is on record in which an insane person, during that stage of typhus fever in

which sane persons are apt to become delirious, became perfectly sane and reasonable, his insanity returning with returning health. Persons of strongest mind in health are often delirious for a short time before death. Since, then, the idiot in the same stage of approaching dissolution may become intelligent, while the insane may become sane under the conditions which make the sane become delirious, we recognize a relationship between the mental and bodily states which might be of considerable use in the treatment of mental diseases. It may well be that conditions of the nervous system which are to be avoided by persons of normal mental qualities may be advantageously superinduced in the case of those of abnormally weak or abnormally violent mind. It is noteworthy that different conditions would seem to be necessary for the idiotic and for the insane, if the cases cited sufficed to afford basis for generalization. For the idiot of Miss Martineau's story became intelligent during the intense depression of the bodily powers immediately preceding dissolution, whereas the insane person became sane during that height of fever when delirium commonly makes its appearance.

Sir H. Holland mentions a case which shows that great bodily depression may affect a person of ordinary clear and powerful mind. "I descended on one and the same day," he says, "two very deep mines in the Hartz mountains, remaining some hours under ground in each. While in the second mine, and exhausted both from fatigue and inanition, I felt the utter impossibility of talking longer with the German Inspector who accompanied me. Every German word and phrase deserted my recollection; and it was not until I had taken food and wine, and been some time at rest, that I regained them again."

A change in the mental condition is sometimes a sign of approaching serious illness, and is felt to be so by the person experiencing it. An American writer, Mr. Butterworth, quotes the following description given by a near relative of his who was suffering from extreme nervous debility: "I am in constant fear of insanity," she said, "and I wish I could be moved to some retreat for the insane. I understand my condition perfectly; my reason does not seem to be impaired; but I can think of *two things at the same time.* This is an indication of mental unsoundness, and is a terror to me. I do not seem to have slept at all for the last six months. If I sleep it must be in a succession of vivid dreams that destroy all impression of somnolence. Since I have been in this condition I seem to have a very vivid impression of what happens to my children who are away from home, and I am often startled to hear that these impressions are correct. I seem to have also a certain power of anticipating what one is about to say, and to read the motives of others. I take no pleasure in this strange increase of mental power; it is all unnatural. I cannot live in this state long, and I often wish I were dead."

It must, however, be remembered that persons who are in a state of extreme nervous debility, not only possess at times abnormal mental qualities, but are also affected morally. As Huxley has well remarked of some stories bearing on spiritualism, they come from persons who can hardly be trusted even according to their own account of themselves. Mr. Butterworth's relation described a mental condition which, even if quite correctly pictured as she understood it, may yet be explained without believing that any very marvelous increase had taken place in her mental powers. Among the vivid impressions which she constantly had of what might be happening to her children away from home, it would have been strange if some had not been correct. The power of anticipating what others were about to say is one which many imagine they have, mistaking the occasional coincidence between their

guesses and what has been next said for indications of a power which, in reality, they do not possess. And so also with regard to the motives of others. Many are apt, especially when out of health, to guess at others' motives, sometimes rightly, but often very wrongly, yet always rightly in their own behalf, no matter what evidence may presently appear to the contrary.

The case cited by Mr. Butterworth affords evidence rather of the unhealthy condition of the patient's mind than of abnormal powers, except as regards the power of thinking of two things at the same time, which we may fairly assume was not ordinarily possessed by its relative. It is rather difficult to define such a power, however. Several persons have apparently possessed the power, showing it by doing two things at the same time which both appear to require thought, and even close attention. Julius Cæsar, for example, could write on one subject and dictate on another simultaneously. But in reality, even in cases such as these, the mind does not think of two things at once. It simply takes them in turn, doing enough with each, in a short time, a mere instant, perhaps, to give work to the pen or to the voice, as the case may be, for a longer time. When Cæsar was writing a sentence, he was not necessarily thinking of what he was writing. He had done the thinking part of the work before; and was free, while continuing the mere mechanical process of writing, to think of matter for dictation to his secretary. So also while he was speaking he was free to think of matter for writing. If, indeed, the thought for each sentence of either kind had occupied an appreciable time, there would have been interruptions of his writing, if not of his dictation (dictation is not commonly a continuous process under any circumstances, even when shorthand writers take down the words). But a practiced writer or speaker can in a moment form a sentence which shall occupy a minute in writing and several seconds in speaking.

I certainly do not myself claim the power of thinking of two things at once—nay, I believe that no one ever had or could have such a power; yet I find it perfectly easy, when lecturing, to arrange the plan for the next ten minutes' exposition of a scientific subject, and to adopt the words themselves for the next twenty seconds or so, while continuing to speak without the least interruption. I can also work out a calculation on the blackboard while continuing to speak of matters outside the subject of the calculation. It is more a matter of habit than an indication of any mental power, natural or acquired, to speak or write sentences, even of considerable length, after the mind has passed on to other matters. In a similar way some persons can write different words with the right and left hands, and this, too, while speaking of other matters. (I have seen this done by Professor Morse, the American naturalist, whose two hands added words to the diagrams he had drawn while his voice dealt with other parts of the drawing: to add to the wonder, too, he wrote the words indifferently from right to left or from left to right.) In reality the person who thus does two things at once is no more thinking of two things at once than a clock is, when the striking and the working machinery are both in action at the same time.*

* Since the above was written I have noticed a passage in Dr. Carpenter's *Mental Physiology*, p. 719, bearing on the matter I have been dealing with: "The following statement recently made to me by a gentleman of high intelligence, the editor of a most important provincial newspaper, would be almost incredible, if cases somewhat similar were not already familiar to us: 'I was formerly,' he said, 'a reporter in the House of Commons; and it several times happened to me that, having fallen asleep from sheer fatigue towards the end of a debate, I had found, on awaking after a short interval of entire unconsciousness, that I had continued to note down correctly the speaker's words.'

As an illustration of special mental power shown in health, by a person whose mental condition in illness we shall consider afterwards, Sir Walter Scott may be mentioned. The account given by his amanuensis has seemed surprising to many, unfamiliar with the nature of literary composition (at least after long practice), but is in reality such as anyone who writes much can quite readily understand, or might even have known must necessarily be correct. "His thoughts," says the secretary to whom Scott dictated his *Life of Napoleon Buonaparte*, "flowed easily and felicitously, without any difficulty to lay hold of them or to find appropriate language" (which, by the way, is more than all would say who had read Scott's *Life of Buonaparte*, and certainly more than can be said of his secretary, unless it really was a familiar experience with him to be unable to lay hold of his thoughts). "This was evident by the absence of all solicitude (*miseria cogitandi*) from his countenance. He sat in his chair, from which he rose now and then, took a volume from the bookcase, consulted it, and restored it to the shelf—all without intermission in the current of ideas, which continued to be delivered with no less readiness than if his mind had been wholly occupied with the words he was uttering. It soon became apparent to me, however, that he was carrying on two distinct trains of thought, one of which was already arranged and in the act of being spoken, while at the same time he was in advance, considering what was afterwards to be said. "This I discovered (he should rather have said, "this I was led to infer") "by his sometimes introducing a word which was wholly out of place—*entertained* instead of *denied*, for example—but which I presently found to belong to the next sentence, perhaps four or five lines further on, which he had been preparing at the very moment when he gave me the words of the one that preceded it." In the same way I have often unconsciously substituted one word for another in lecturing, the word used always belonging to a later sentence than the word intended to be used. I have noticed also this peculiarity, that when a substitution of this kind has been once made, an effort is required to avoid repeating the mistake, even if it be not repeated quite unconsciously, to the end of the discourse. In this way, for example, I once throughout an entire lecture used the word "heavens" for the word "screen" (the screen on which lantern pictures were shown).

'I believe,' he added, 'that this is not an uncommon experience among Parliamentary reporters.' The reading aloud with correct emphasis and intonation, or the performance of a piece of music, or (as in the case of Albert Smith) the recitation of a frequently-repeated composition, whilst the conscious mind in *entirely engrossed* in its own thoughts and feelings may be thus accounted for without the supposition that the mind is actively engaged in two different operations at the same moment, which would seem tantamount to saying that there are two egos in the same organism." An instance in my own experience seems even more remarkable than the reporter's work during sleep, for he had but to continue a mechanical process, whereas in my case there must have been thought. Late one evening at Cambridge I began a game of chess with a fellow-student (now a clergyman, and well-known in chess circles). I was tired after a long day's rowing, but continued the game to the best of my ability, until at a certain stage I fell asleep, or rather fell into a waking-dream. At any rate, all remembrance of what passed after that part of the game had entirely escaped me when I awoke or returned to consciousness about three in the morning. The chessboard was there, but the men were not as when the last conscious move was made. The opponent's king was checkmated. I supposed my opponent had set the men in this position either as a joke or in trying over some end game. But I was assured that the game had continued to the end, and that I had won, apparently playing as if fully conscious! Of course I cannot certify this of my own knowledge.

A similar peculiarity may be noticed with written errors. Thus, in my treatise on a scientific subject, in which the utmost care had been given to minute points of detail, I once wrote "seconds" for "minutes" throughout several pages — in fact, from the place where first the error was made, to the end of the chapter. (See the *first* edition of my *Transits of Venus*, pp. 131–136, noting as an additional peculiarity that the whole object of the chapter in which this mistake was made was to show how many minutes of difference existed between the occurrence of certain events.)

An even more curious instance of a mistake arising from doing one thing while thinking of another occurred to me fourteen years ago. I was correcting the proof-sheets of an astronomical treatise in which occurred these words: "Calling the mean distance of the earth 1, Saturn's mean distance is 9·539; again, calling the earth's period 1, Saturn's mean period is 29·457:—now what relation exists between these numbers 9·539 and 29·457 and their powers? The first is less than the second, but the square of the first is plainly greater than the second; we must therefore try higher powers," etc., etc. The passage was quite correct as it stood, and if the two processes by which I was correcting verbal errors and following the sense of the passage had been really continuous processes of thought, unquestionably the passage would have been left alone. If the passage had been erroneous, and had been simply left in that condition, the case would have been one only too familiar to those who have had occasion to correct proofs. But what I actually did was deliberately to make nonsense of the passage while improving the sound of the second sentence. I made it run, "the first is less than the second, but the square of the first is plainly greater than the square of the second," the absurdity of which statement a child would detect. If the first proof in its correct form, with the incorrect correction carefully written down in the margin, had not existed when, several months later, the error was pointed out in the *Quarterly Journal of Science*, I should have felt sure that I had written the words wrongly at the outset. For blunders such as this are common enough. But that I should deliberately have taken a correctly-worded sentence and altered it into utter absurdity I could not, but for the evidence, have believed to be possible. The case plainly shows that not only may two things be done at once when the mind, nevertheless, is thinking only of one, but that something may be done which suggests deliberate reflection when in reality the mind is elsewhere or not occupied at all. For in this case both the processes on which I was engaged were manifestly carried on without thought, one being purely mechanical, and the other, though requiring thought if properly attended to, being so imperfectly effected as to show that no thought was given to it.

To return to Sir Walter Scott. It is known but too well that during the later years of his life there came with bodily prostration a great but not constant failure of his mental powers. Some of the phenomena presented during this part of his career are strikingly illustrative of abnormal mental action occurring even at times when the mental power is on the whole much weakened. *The Bride of Lammermoor*, though not one of the best of Scott's novels, is certainly far above such works as *Count Robert of Paris*, *The Betrothed*, and *Castle Dangerous*. Its popularity may perhaps be attributed chiefly to the deep interest of the "ower true tale" on which it is founded: but some of the characters are painted with exceeding skill. Lucy herself is almost a nonentity, and Edgar is little more than a gloomy, unpleasant man, made interesting only by the troubles which fall on him. But Caleb Balderstone and Ailsie Gourlay stand out from the canvas as if alive; they are

as lifelike and natural, yet as thoroughly individualized as Edie Ochiltree and Meg Merrilies. The novel neither suggested when it first appeared, nor has been regarded even after the facts became known, as suggesting that Scott. when he wrote it, was in bad health, Yet it was produced under pressure of severe illness, and when Scott was at least in this sense unconscious, that nothing of what he said and did in connection with the work was remembered when he recovered. "The book," says James Ballantyne, "was not only written, but published, before Mr. Scott was able to rise from his bed; and he assured me that when it was first put into his hands in a complete shape, *he did not recollect one single incident, character, or conversation it contained!* He did not desire me to understand, nor did I understand, that his illness had erased from his memory the original incidents of the story, with which he had been acquainted from his boyhood. These remained rooted where they had ever been; or, to speak more explicitly, he remembered the general facts of the existence of the father and mother, of the son and daughter, of the rival lovers, of the compulsory marriage, and the attack made by the bride upon the hapless bridegroom, with the general catastrophe of the whole. *All these things he recollected*, just as he did before he took to his bed; *but he literally recollected nothing else*—not a single character woven by the romancer, not one of the many scenes and points of humor, not *anything with which he was himself connected*, as the writer of the work.

Later, when Scott was breaking down under severe and long-continued labor, and first felt the approach of the illness which ultimately ended in death, he experienced strange mental phenomena. In his diary for February 17, 1829, he notes that on the preceding day, at dinner, though in company with two or three old friends, he was haunted by "a sense of pre-existence," a confused idea that nothing that passed was said for the first time; that the same topics had been discussed, and that the same persons had expressed the same opinions before. "There was a vile sense of a want or reality in all that I did or said."

Dr. Reynolds related to Dr. Carpenter a case in which a Dissenting minister, who was in apparently sound health, was rendered apprehensive of brain-disease—though, as it seemed, without occasion—by lapse of memory similar to that experienced by Sir Walter Scott. He "went through an entire pulpit service on a certain Sunday morning with the most perfect consistency—his choice of hymns and lessons, and his *extempore* prayer being all related to the subject of his sermon. On the following Sunday morning he went through the introductory part of his service in precisely the same manner—giving out the same hymns, reading the same lessons, and directing the *extempore* prayer in the same channel. He then gave out the same text and preached the very same sermon as he had done on the previous Sunday. When he came down from the pulpit, it was found that he had not the smallest remembrance of having gone through precisely the same service on the previous Sunday; and when he was assured of it, he felt considerable uneasiness lest his lapse of memory should indicate some impending attack of illness. None such, however, supervened; and no *rationale* can be given of this curious occurrence, the subject of it not being liable to fits of 'absence of mind' and not having had his thoughts engrossed at the time by any other special pre-occupation." It is possible that the explanation here is the simple one of mere coincidence. Whether this explanation is available or not would depend entirely on the question whether the preacher's memory was ordinarily trustworthy or not, whether in fact he would remember the arrangements, prayers, sermon, etc., he had given on any occasion. These

matters, becoming, after long habit, almost automatic, it might very well happen that the person going through such duties would remember them no longer and no better than one who had been present when they were performed, and who had not paid special attention to them. That if he had thus unconsciously carried out his duties on one Sunday, he should (being to this degree forgetful) conduct them in precisely the same way on the next Sunday, would rather tend to show that his mental faculties were in excellent working order than the reverse. Wendell Holmes tells a story which effectively illustrates my meaning; and he tells it so pleasantly (as usual) that I shall quote it unaltered. "Sometimes, but rarely," he says, "one may be caught making the same speech twice over, and yet be held blameless. Thus a certain lecturer" (Holmes himself, doubtless), "after performing in an inland city, where dwells a *litteratrice* of note, was invited to meet her and others over the social tea cup. She pleasantly referred to his many wanderings in his new occupation. 'Yes,' he replied, 'I am like the huma, the bird that never lights, being all ways in the cars, as he is always on the wing.' Years elapsed. The lecturer visited the same place once more for the same purpose. Another social cup after the lecture, and a second meeting with the distinguished lady. 'You are constantly going from place to place,' she said. 'Yes,' he answered, 'I am like the huma,' and finished the sentence as before. What horror when it had flashed over him that he had made this fine speech, word for word, twice over! Yet it was not true, as the lady might perhaps have fairly inferred, that he had embellished his conversation with the huma daily during the whole interval of years. On the contrary, he had never once thought of the odious fowl until the recurrence of precisely the same circumstances brought up precisely the same idea." He was not in the slightest degree afraid of brain disease. On the contrary, he considered the circumstance indicative of good order in the mental mechanism. "He ought to have been proud," says Holmes, speaking for him, and meaning no doubt that he *was* proud, "of the accuracy of his mental adjustments. *Given certain factors, and a sound brain should always evolve the same fixed product with the certainty of Babbage's calculating machine.*"

Somewhat akin to the unconscious recurrence of mental processes after considerable intervals of time is the tendency to imitate the actions of others, as though sharing in their thoughts, and according to many, *because* mind acts upon mind. This tendency, though not always associated with disease, is usually a sign of bodily illness. Dr. Carpenter mentions the following singular case, but rather as illustrating generally the influence of suggestions derived from external sources in determining the current of thought, than as showing how prone the thoughts are to run in undesirable currents when the body is out of health: "During an epidemic of fever, in which an active delirium had been a common symptom, it was observed that many of the patients of one particular physician were possessed by a strong tendency to throw themselves out of the window, whilst no such tendency presented itself in unusual frequency in the practice of others. The author's informant, Dr. C., himself a distinguished professor in the university, explained the tendency of what had occurred within his own knowledge, he having been himself attacked by the fever, and having been under the care of this physician, his friend and colleague, Dr. A. Another of Dr. A.'s patients, whom we shall call Mr. B., seems to have been the first to make the attempt in question, and, impressed with the necessity of taking due precautions, Dr. A. then visited Dr. C., *in whose hearing* he gave directions to have the windows properly secured, as Mr. B. had attempted to throw himself out. Now, Dr. C. distinctly

remembers that, although he had not previously experienced any such desire, it came upon him with great urgency as soon as ever the idea was thus suggested to him, his mind being just in that state of incipient delirium which is marked by the temporary dominance of some one idea, and by the want of volitional power to withdraw the attention from it. And he deemed it probable that, as Dr. A. went on to Mr. D., Mr. E., etc., and gave similar directions, a like desire would be excited in the minds of all those who might happen to be in the same impressible condition." The case is not only interesting as showing how the mind in disease receives certain impressions more strongly than in health, and in a sense may thus be said to possess for the time an abnormal power, but it affords a useful hint to doctors and nurses, who do not always (the latter indeed scarcely ever) consider the necessity of extreme caution when speaking about their patients and in their presence. It is probable that a considerable proportion of the accidents, fatal and otherwise, which have befallen delirious patients might be traced to incautious remarks made in their hearing by foolish nurses or forgetful doctors.

In some cases doctors have had to excite a strong antagonistic feeling against tendencies of this kind. Thus, Zerffi relates that an English physician was once consulted by the mistress of a ladies' school, where many girls had become liable to fits of hysterics. He tried several remedies, but in vain. At last, justly regarding the epidemic as arising from the influence of imagination on the weaker girls (one hysterical girl having infected the others), he determined to exert a stronger antagonistic influence on the weak minds of his patients. He therefore remarked casually to the mistress of the school, in the hearing of the girls, that he had now tried all methods but one, which he would try, as a last resource, when next he called—"the application of a red-hot iron to the spine of the patients, so as to quiet their nervously-excited systems." "Strange to say," remarks Zerffi—meaning no doubt, 'it is hardly necessary to say that'—"the red-hot iron was never applied, for the hysterical attacks ceased as if by magic."

In another case mentioned by Zerffi, a revival mania in a large school near Cologne was similarly brought to an abrupt end. The Government sent an inspector. He found that the boys had visions of Christ, the Virgin, and departed saints. He threatened to close the school if these visions continued, and thus to exclude the students from all the prospects which their studies afforded them. "The effect was as magical as the red-hot iron remedy — the revivals ceased as if by magic."

The following singular cases are related in Zimmermann's *Solitude:* "A nun, in a very large convent in France, began to mew like a cat. At last all the nuns began to mew together every day at a certain time, and continued mewing for several hours together. This daily cat-concert continued, until the nuns were informed that a company of soldiers was placed by the police before the entrance to the convent, and that the soldiers were provided with rods with which they would whip the nuns until they promised not to mew any more." . . . "In the fifteenth century, a nun in a German convent fell to biting her companions. In the course of a short time all the nuns of this convent began biting each other. The news of this infatuation among the nuns soon spread, and excited the same elsewhere; the biting mania passing from convent to convent through a great part of Germany. It afterwards visited the nunneries of Holland, and even spread as far as Rome." No suggestion of bodily disease is made in either case. But any one who considers how utterly unnatural is the manner of life in monastic communities will not need the evidence derived from the spread of such preposterous habits to be as

sured that in convents the perfectly sane mind in a perfectly healthy body must be the exception rather than the rule.

The dancing mania, which spread through a large part of Europe in the fourteenth and fifteenth centuries, although it eventually attacked persons who were seemingly in robust health, yet had its origin in disease. Dr. Hecker, who has given the most complete account we have of this strange mania, in his *Epidemics of the Middle Ages*, says that when the disease was completely developed the attack commenced with epileptic convulsions. "Those affected fell to the ground senseless, panting and laboring for breath. They foamed at the mouth, and suddenly springing up, began their dance amidst strange contortions. They formed circles hand in hand, and appearing to have lost all control over their senses, continued dancing, regardless of the bystanders, for hours together, in wild delirium, until at length they fell to the ground in a state of exhaustion. They then complained of extreme oppression, and groaned as if in the agonies of death, until they were swathed in clothes bound tightly round their waists; upon which they again recovered, and remained free from complaint until the next attack. . . . While dancing they neither saw nor heard, being insensible to external impressions through the senses; but they were haunted by visions, their fancies conjuring up spirits, whose names they shrieked out; and some of them afterwards asserted that they felt as if they had been immersed in a stream of blood, which obliged them to leap so high. Others during the paroxysm saw the heavens open, and the Savior enthroned with the Virgin Mary, according as the religious notions of the age were strangely and variously reflected in their imaginations." The epidemic attacked people of all stations, but especially those who led a sedentary life, such as shoemakers and tailors; yet even the most robust peasants finally yielded to it. They "abandoned their labors in the fields as if they were possessed by evil spirits, and those affected were seen assembling indiscriminately from time to time, at certain appointed places, and unless prevented by the lookers-on, continued to dance without intermission, until their very last breath was expended. Their fury and extravagance of demeanor so completely deprived them of their senses, that many of them dashed their brains out against the walls and corners of buildings, or rushed headlong in rapid rivers, where they found a watery grave. Roaring and foaming as they were, the bystanders could only succeed in restraining them by placing benches and chairs in their way, so that by the high leaps they were thus tempted to take, their strength might be exhausted. As soon as this was the case they fell, as it were, lifeless to the ground, and by very slow degrees recovered their strength. Many there were who even with all this exertion had not expended the violence of the tempest which raged within them; but awoke with newly revived powers, and again and again mixed with the crowd of dancers; until at length the violent excitement of their disordered nerves was allayed by the great involuntary exertion of their limbs, and the mental disorder was calmed by the exhaustion of the body. The cure effected by these stormy attacks was in many cases so perfect, that some patients returned to the factory or plough, as if nothing had happened. Others, on the contrary, paid the penalty of their folly by so total a loss of power that they could not regain their former health, even by the employment of the most strengthening remedies."

It may be doubted, perhaps, by some whether such instances as these illustrate so much the state to which the mind is reduced when the body is diseased, as the state to which the body is reduced when the mind is diseased, though, as we have seen, the dancing mania when fully developed followed always on bodily illness. In

the cases we now have to deal with, the diseased condition of the body was unmistakable.

Mrs. Hemans on her deathbed said that it was impossible for imagination to picture or pen to describe the delightful visions which passed before her mind. They made her waking hours more delightful than those passed in sleep. It is evident that these visions had their origin in the processes of change affecting the substance of the brain as the disease of the body progressed. But it does not follow that the substance of the brain was undergoing changes necessarily tending to its ultimate decay and dissolution. Quite possibly the changes were such as might occur under the influence of suitable medicinal or stimulant substances, and without any subsequent ill effects. Dr. Richardson, in an interesting article on ether-drinking and extra-alcoholic intoxication (*Gentleman's Magazine* for October), makes a remark which suggests that the medical men of our day look forward to the discovery of means for obtaining some such influence over the action of the brain. After describing the action of methylic and ethylic ethers in his own case, he says: "They who have felt this condition, who have lived as it were in another life, however transitorily, are easily led to declare with Davy that 'nothing exists but thoughts! the universe is composed of impressions, ideas, pleasures and pains!' I believe it is so, and that we might by scientific art, and there is such an art, learn to live altogether in a new sphere of impressions, ideas, pleasures, and pains." "But stay," he adds, as if he had said too much. "I am anticipating, unconsciously, something else that is in my mind. The rest is silence; I must return to the world in which we now live, and which all know."

Mr. Butterworth mentions the case of the Rev. William Tennent, of Freehold, New Jersey, as illustrative of strange mental faculties possessed during disease. Tennant was supposed to be far gone in consumption. At last, after a protracted illness, he seemingly died, and preparations were made for his funeral. Not only were his friends deceived, but he was deceived himself, for he thought he was dead, and that his spirit had entered Paradise. "His soul, as he thought, was borne aloft to celestial altitudes, and was enraptured by visions of God and all the hosts of Heaven. He seemed to dwell in an enchanted region of limitless light and inconceivable splendor. At last an angel came to him and told him he must go back. Darkness, like an overawing shadow, shut out the celestial glories; and, full of sudden horror, he uttered a deep groan. This dismal utterance was heard by those around him, and prevented him from being buried alive, after all the preparations had been made for the removal of the body."

We must not fall into the mistake of supposing, however, as many seem to do, that the visions seen under such conditions, or by ecstatics, really present truths of which the usual mental faculties could not become cognizant. We have heard such cases as the deathbed visions of Mrs. Hemans and the trance visions of Tennent urged as evidence in favor of special forms of doctrine. We have no thought of attacking these, but assuredly they derive no support from evidence of this sort. The dying Hindoo has visions which the Christian would certainly not regard as heaven-born. The Mahomedan sees the plains of Paradise, peopled by the houris of his heaven, but we do not, on that account, accept the Koran as the sole guide to religious truth. The fact is, that the visions pictured by the mind during the disease of the body, or in the ecstatic condition, have their birth in the mind itself, and take their form from the teachings with which that mind has been imbued. They may, indeed, seem utterly unlike those we should expect from the known character of the visionary, just as the thoughts of a dying man may be, and

often are, very far removed from the objects which had occupied all his attention during the later years of his life. But if the history of the childhood and youth of an ecstatic could be fully known, or if (which is exceedingly unlikely) we could obtain a strictly truthful account of such matters from himself, we should find nearly every circumstance of his visions explained, or at least an explanation suggested. For, after all, much which would be necessary to exactly show the origin of all he saw would be lost, since the brain retains impressions of many things of which the conscious memory has entirely passed away.

The vivid picturing of forgotten events of life is a familiar experience of the opium-eater. Thus, De Quincy says: "The minutest incidents of childhood or forgotten scenes of later years were often revived. I could not be said to recollect them, for if I had been told of them when waking, I should not have been able to acknowledge them as part of my past experience. But placed as they were before me in dreams, like intuitions, and clothed in all their evanescent circumstances and accompanying feelings, I recognized them instantaneously." A similar return of long-forgotten scenes and incidents to the mind may be noticed, though not to the same degree, when wine has been taken in moderate quantity after a long fast.

The effects of hachisch are specially interesting in this connection, because, unless a very powerful dose has been taken, the hachischin does not wholly lose the power of introspection, so that he is able afterwards to recall what has passed through his mind when he was under the influence of the drug. Now, Moreau, in his interesting *Etudes Psychologiques* (*Du Hachich et d'Aliénation Mentale*), says that the first result of a dose sufficient to produce the *hachisch fantasia* is a feeling of intense happiness. "It is really *happiness* which is produced by the hachisch; and by this simply an enjoyment entirely moral, and by no means sensual, as we might be induced to suppose. This is surely a very curious circumstance, and some remarkable inferences might be drawn from it; this, for instance, among others—that every feeling of joy and gladness, even when the cause of it is exclusively moral—that those enjoyments which are least connected with material objects, the most spiritual, the most ideal, may be nothing else than sensations purely physical, developed in the interior of the system, as are those procured by hachisch. At least so far as relates to that of which we are internally conscious, there is no distinction between these two orders of sensations, in spite of the diversity in the causes to which they are due, for the hachisch-eater is happy, not like the gourmand or the famished man when satisfying his appetite, or the voluptuary in gratifying his amative desires, but like him who hears tidings which fill him with joy, like the miser counting his treasures, the gambler who is successful at play, or the ambitious man who is intoxicated with success."

My special object, however, in noting the effects of opium and hachisch, is rather to note how the mental processes or faculties observed during certain states of disease may be produced artificially, than to enter into the considerations discussed by Dr. Moreau. It is singular that while the Mohamedan order of Hachischin (or Assassins) bring about, by the use of their favorite drug, such visions as accompany the progress of certain forms of disease, the Hindoo devotees, called Yogi, are able to produce artificially the state of mind and body recognized in cataleptic patients. The less advanced Yogi can only enter the state of abstraction called reverie, but the higher orders can simulate absolute inanition, the heart apparently ceasing to beat, the lungs to act and the nerves to convey impressions to the brain, even though the body be subjected to processes which would cause extreme torture under ordinary

conditions. "When in this state," says Carpenter, "the Yogi are supposed to be completely possessed by Brahma, 'the supreme soul,' and to be incapable of sin in thought, word or deed." It has been supposed that this was the state into which those entered who in old times were resorted to as oracles. But it has happened that in certain stages of disease the power of assuming the death-like state has been possessed for a time. Thus, Colonel Townsend, who died in 1797, we read, had in his last sickness the extraordinary power of apparently dying and returning to life again at will. "I found his pulse sink gradually," says Dr. Cheyne, who attended him, "so that I could not feel it by the most exact or nice touch. Dr. Raymond could not detect the least motion of the heart, nor Dr. Skrine the least soil of the breath upon the bright mirror held to the mouth. We began to fear he was actually dead. He then began to breathe softly." Colonel Townsend repeated the experiment several times during his illness, and could always render himself insensible at will.

Lastly, I may mention a case, which, however, though illustrating in some degree the influence of bodily illness on the mind, shows still more strikingly how the mind may influence the body—that of Louise Lateau, the Belgian peasant. This girl had been prostrated by a long and exhausting illness, from which she recovered rapidly after receiving the sacrament. This circumstance made a strong impression on her mind. Her thoughts dwelt constantly on the circumstances attending the death of Christ. At length she noticed that on every Friday blood came from a spot on her left side. "In the course of a few months similar bleeding spots established themselves on the front and back of each hand, and on the upper surface of each foot, while a circle of small spots formed in the forehead, and the hæmorrhage from these recurred every Friday, sometimes to a considerable amount. About the same time, fits of ecstacy began to occur, commencing every Friday between eight and nine in the morning and ending about six in the evening, interrupting her in conversation, in prayer, or in manual occupations. This state," says Dr. Carpenter, "appears to have been intermediate between that of the biologized and that of the hypnotized subject; for whilst as unconscious as the latter of all sense-impressions, she retained, like the former, a recollection of all that had passed through her mind during the ecstacy. She described herself as suddenly plunged into a vast flood of bright light, from which more or less distinct forms began to evolve themselves, and she then witnessed the several scenes of the Passion successively passing before her. She minutely described the cross and the vestments, the wounds, the crown of thorns about the head of the Savior, and gave various details regarding the persons about the cross, the disciples, holy women, Jews and Roman soldiers. And the progress of her vision might be traced by the succession of actions she performed at various stages of it. Most of these movements were expressive of her own emotions, whilst regularly, about three in the afternoon, she extended her limbs in the form of a cross. The fit terminated with a state of extreme physical prostration, the pulse being scarcely perceptible, the breathing slow and feeble and the whole surface bedewed with a cold perspiration. After this state had continued for about ten minutes, a return to the normal condition rapidly took place."

There seems no reason for supposing that there was any deceit on the part of Louise Lateau herself, though that she was self-deceived no one can reasonably doubt. Of course many in Belgium, especially the more ignorant and superstitious (including large numbers of the clergy and of religious orders of men and women), believed that her ecstasies were miraculous, and no doubt she believed so herself. But none of the circum-

stances observed in her case, or related by her, were such as the physiologist would find any difficulty in accepting or explaining. Her visions were such as might have been expected in a person of her peculiar nervous organization, weakened as her body had been by long illness, and her mind affected by what she regarded as her miraculous recovery. As to the transudation of blood from the skin, Dr. Tuke, in his "Illustrations of the Influence of the Mind upon the Body in Health and Disease" (p. 267), shows the phenomenon to be explicable naturally. It is a well-authenticated fact, that under strong emotional excitement blood escapes through the perspiratory ducts, apparently through the rupture of the walls of the capillary passages of the skin.

We see, then, in Louise Lateau's case, how the mind affected by disease may acquire faculties not possessed during health, and how in turn the mind thus affected may influence the body so strangely as to suggest to ignorant or foolish persons the operation of supernatural agencies.

The general conclusion to which we seem led by the observed peculiarities in the mental faculties during disease is, that the mind depends greatly on the state of the body for the co-ordination of its various powers. In health, these are related in what may be called the normal manner. Faculties capable of great development under other conditions exist in moderate degree only, while probably, either consciously or unconsciously, certain faculties are held in control by others. But during illness, faculties not ordinarily used suddenly or very rapidly acquire undue predominance, and controlling faculties usually effective are greatly weakened. Then for a while the mental capacity seems entirely changed. Powers supposed not to exist at all (for of mental faculties, as of certain other qualities, *de non existentibus et de non apparentibus eadem est ratio*) seem suddenly created, as if by a miracle. Faculties ordinarily so strong as to be considered characteristic seem suddenly destroyed, since they no longer produce any perceptible effect. Or, as Brown-Sequard says, summing up the results of a number of illustrative cases described in a course of lectures delivered in Boston: "It would seem that the mind is largely dependent on physical conditions for the exercise of its faculties, and that its strength and most remarkable powers, as well as its apparent weakness, are often more clearly shown and recognized by some inequality of action in periods of disturbed and greatly impaired health."

IV.

DUAL CONSCIOUSNESS.

Rather more than two years ago, I considered, in the pages of "Science Byways," the theory originally propounded by Sir Henry Holland, but then recently advocated by Dr. Brown-Sequard, of New York, that we have two brains, each perfectly sufficient for the full performance of mental functions. I did not, for my own part, either advocate or oppose that theory, but simply considered the facts which had been urged in support of it, or which then occurred to me as bearing upon it, whether for or against. I showed, however, that some classes of phenomena which had been quoted in support of the theory seemed in reality opposed to it, when all circumstances were considered. For example, Brown-Sequard had referred to some of those well-known cases in which, during severe illness, a language forgotten in the patient's ordinary condition had been recalled, the recollection of the language enduring only while the illness lasted. I pointed to a case in which there had not been two mental conditions only, as indicated by the language of the patient, but three; the person in question having in the beginning of his illness spoken English only, in the middle of his illness French only, and on the day of his death Italian

only (the language of his childhood). The interpretation of that case, and of others of a similar kind, must, I remarked, be very different from that which Brown-Sequard assigned, perhaps correctly, "to cases of twofold mental life." A case of the last-named kind has recently been discussed in scientific circles, which seems to me to bear very forcibly on the question whether Holland's theory of a dual brain is correct. I propose briefly to describe and examine this case, and some others belonging to the same class, two of which were touched upon in my former essay, but slightly only, as forming but a small part of the evidence dealt with by Brown-Sequard, whose arguments I was then considering. I wish now to deal, not with the question of the duality of the brain, but with the more general question of dual or intermittent consciousness.

Among the cases dealt with by Brown-Sequard was that of a boy at Notting Hill, who had two mental lives. Neither life presented anything specially remarkable in itself. The boy was a well-mannered lad in his abnormal as well as in his normal condition,—or one might almost say (as will appear more clearly after other cases have been considered) that the *two* boys were quiet and well-behaved. But the two mental lives were entirely distinct. In his normal condition the boy remembered nothing which had happened in his abnormal condition; and *vice versa*, in his abnormal condition he remembered nothing which had happened in his normal condition. He changed from either condition to the other in the same manner. "The head was seen to fall suddenly, and his eyes closed, but he remained erect if standing at the time, or if sitting he remained in that position (if talking, he stopped for a while, and if moving, he stopped moving); and after a minute or two his head rose, he started up, opened his eyes, and was wide awake again." While the head was drooped he appeared as if either sleeping or falling asleep. He remained in the abnormal state for a period which varied between one hour and three hours; it appears that every day, or nearly every day, he fell once into his abnormal condition.

This case need not detain us long; but there are some points in it which deserve more attention than they seem to have received from Dr. Brown-Sequard. It is clear that if the normal and abnormal mental lives of this boy had been entirely distinct, then in the abnormal condition he would have been ignorant and—in those points in which manners depend on training—ill-mannered. He would have known only, in this condition, what he had learned in this condition; and as only about a tenth part of his life was passed in the abnormal condition, and presumably that portion of his life not usually selected as a suitable time for teaching him, the abnormal boy would of necessity have been much more backward in all things which the young are taught than the normal boy. As nothing of this kind was noted, it would appear probable that the boy's earlier years were common to both lives, and that his unconsciousness of his ordinary life during the abnormal condition extended only to those parts of his ordinary life which had passed since these seizures began. Unfortunately, Brown-Sequard's account does not mention when this had happened.

It does not appear that the dual brain theory is required so far as this case is concerned. The phenomena seem rather to suggest a peculiarity in the circulation of the brain corresponding in some degree to the condition probably prevailing during somnambulism or hypnotism, though with characteristic differences. It may at least be said that no more valid reason exists for regarding this boy's case as illustrating the distinctive duality of the brain than for so regarding some of the more remarkable cases of somnambulism;

for though these differ in certain respects from the boy's case, they resemble it in the circumstances on which Brown-Sequard's argument is founded. Speaking generally of hypnotism—that is, of somnambulism artificially produced—Dr. Carpenter says: "In hypnotism, as in ordinary somnambulism, no remembrance whatever is preserved, in the waking state, of anything that may have occurred during its continuance; although the previous train of thought may be taken up and continued uninterruptedly on the next occasion when hypnotism is induced." In these respects the phenomena of hypnotism precisely resemble those of dual consciousness as observed in the boy's case. In what follows, we observe features of divergence. Thus "when the mind is not excited to activity by the stimulus of external impressions, the hypnotized subject appears to be profoundly asleep; a state of complete torpor, in fact, being usually the first result of the process just described, and any subsequent manifestation of activity being procurable only by the prompting of the operator. The hypnotized subject, too, rarely opens his eyes; his bodily movements are usually slow; his mental operations require a considerable time for their performance; and there is altogether an appearance of heaviness about him which contrasts strongly with the comparatively wide-awake air of him who has not passed beyond the ordinary biological state."

It would not be easy to find an exact parallel to the case of the two-lived boy in any recorded instance of somnambulism. In fact, it is to be remembered that recorded instances of mental phenomena are all selected for the very reason that they are exceptional, so that it would be unreasonable to expect them closely to resemble each other. One case, however, may be cited, which in certain points resembles the case of Dr. Brown-Sequard's patient. It occurred within Dr. Carpenter's own experience. A young lady of highly nervous temperament suffered from a long and severe illness, characterized by all the most marked forms of hysterical disorder. In the course of this illness came a time when she had a succession of somnambulistic seizures. "The state of somnambulism usually supervened in this case in the waking state, instead of arising, as it more commonly does, out of the conditions of ordinary sleep. In this condition her ideas were at first entirely fixed upon one subject—the death of her only brother, which had occurred some years previously. To this brother she had been very strongly attached; she had nursed him in his last illness; and it was perhaps the return of the anniversary of his death, about the time when the somnambulism first occurred, that gave to her thoughts that particular direction. She talked constantly of him, retraced all the circumstances of his illness, and was unconscious of anything that was said to her which had not reference to this subject. . . . Although her eyes were open, she recognized no one in this state—not even her own sister, who, it should be mentioned, had not been at home at the time of her brother's last illness." (It will presently appear, however, that she was able to recognize those who were about her during these attacks, since she retained ill-feeling against one of them; moreover, the sentences which immediately follow suggest that the sense of sight was not dormant.) "It happened on one occasion that, when she passed into this condition, her sister, who was present, was wearing a locket containing some of their deceased brother's hair. As soon as she perceived this locket she made a violent snatch at it, and would not be satisfied until she had got it into her possession, when she began to talk to it in the most endearing and even extravagant terms. Her feelings were so strongly excited on this subject, that it was deemed prudent to check them; and as she was inaccessible to all entreaties for the relinquishment of the

locket, force was employed to obtain it from her. She was so determined, however, not to give it up, and was so angry at the gentle violence used, that it was found necessary to abandon the attempt, and having become calmer after a time, she passed off into ordinary sleep. Before going to sleep, however, she placed the locket under her pillow, remarking, 'Now I have hid it safely, and they shall not take it from me.' On awaking in the morning she had not the slightest consciousness of what had passed; but the impression of the excited feelings still remained, for she remarked to her sister, 'I cannot tell what it is that makes me feel so, but every time that S. comes near me I have a kind of shuddering sensation;' the individual named being a servant, whose constant attention to her had given rise to a feeling of strong attachment on the side of the invalid, but who had been the chief actor in the scene of the previous evening. This feeling wore off in the course of a day or two. A few days afterwards the somnambulism again returned; and the patient being upon her bed at the time, immediately began to search for the locket under her pillow." As it had been removed in the interval, "she was unable to find it, at which she expressed great disappointment, and continued searching for it, with the remark, 'It *must* be there—I put it there myself a few minutes ago, and no one can have taken it away.' In this state the presence of S. renewed her previous feelings of anger; and it was only by sending S. out of the room that she could be calmed and induced to sleep. The patient was the subject of many subsequent attacks, in every one of which the anger against S. revived, until the current of thought changed, no longer running exclusively upon what related to her brother, but becoming capable of direction by *suggestions* of various kinds presented to her mind, either in conversation, or, more directly, through the several organs of sense."

I have been particular in quoting the above account, because it appears to me to illustrate well, not only the relation between the phenomena of dual consciousness and somnambulism, but the dependence of either class of phenomena on the physical condition. If it should appear that dual consciousness is invariably associated with some disorder either of the nervous system or of the circulation, it would be impossible, or at least very difficult to maintain Brown-Sequard's explanation of the boy's case. For one can hardly imagine it possible that a disorder of the sort should be localized so far as the brain is concerned, while in other respects affecting the body generally. It so chances that the remarkable case recently dealt with by French men of science forms a sort of connecting link between the boy's case and the case just cited. It closely resembles the former in certain characteristic features, while it resembles the latter in the evidence which it affords of the influence of the physical condition on the phenomena of double consciousness. The original narrative by M. Azam is exceedingly prolix; but it has been skillfully condensed by Mr. H. J. Slack, in the pages of a quarterly journal of science. I follow his version in the main.

The subject of the disorder, Felida X., was born in Bordeaux, in 1843. Until the age of thirteen she differed in no respect from other girls. But about that time symptoms of hysterical disorder presented themselves, and although she was free from lung-disease, she was troubled with frequent spitting of blood. After this had continued about a year, she for the first time manifested the phenomena of double consciousness. Sharp pains attacked both temples, and in a few moments she became unconscious. This lasted ten minutes, after which she opened her eyes, and entered into what M. Azam calls her second state, in which she remained for an hour or two, after which the pains and unconsciousness came on again, and she

returned to her ordinary condition. At intervals of about five or six days such attacks were repeated; and her relations noticed that her character and conduct during her abnormal state were changed. Finding, also, that in her usual condition she remembered nothing which had passed when she was in the other state, they thought she was becoming idiotic; and presently called in M. Azam, who was connected with a lunatic asylum. Fortunately, he was not so enthusiastic a student of mental aberration as to recognize a case for the lunatic asylum in every instance of phenomenal action. He found Felida intelligent, but melancholy, morose and taciturn, very industrious, and with a strong will. She was very anxious about her bodily health. At this time the mental changes occurred more frequently than before. Nearly every day, as she sat with her work on her knees, a violent pain shot suddenly through her temples, her head dropped upon her breast, her arms fell by her side, and she passed into a sort of sleep, from which neither noises, pinches, nor pricks could awaken her. This condition lasted now only two or three minutes. "She woke up in quite another state, smiling gaily, speaking briskly, and trilling (*fredonnant*) over her work, which she recommenced at the point where she left it. She would get up, walk actively, and scarcely complained of any of the pains she had suffered from so severely a few minutes before. She busied herself about the house, paid calls, and behaved like a healthy young girl of her age. In this state she remembered perfectly all that had happened in her two conditions." (In this respect her case is distinct from both the former, and is quite exceptional. In fact, the inclusion of the consciousness of both conditions during the continuance of one condition only, renders her case not, strictly speaking, one of double consciousness, the two conditions not being perfectly distinct from each other). "In this second life, as in the other, her moral and intellectual faculties, though different, were incontestably sound. After a time (which, in 1858, lasted three or four hours), her gaiety disappeared, the torpor suddenly ensued, and in two or three minutes she opened her eyes and re-entered her ordinary life, resuming any work she was engaged in just where she left off. In this state she bemoaned her condition, and was quite unconscious of what had passed in the previous state. If asked to continue a ballad she had been singing, she knew nothing about it, and if she had received a visitor, she believed she had seen no one. The forgetfulness extended to everything which happened during her second state, and not to any ideas or information acquired before her illness." Thus her early life was held in remembrance during both her conditions, her consciousness in these two conditions being in this respect single; in her second or less usual condition she remembered also all the events of her life, including what had passed since these seizures began; and it was only in her more usual condition that a portion of her life was lost to her—that, namely, which had passed during her second condition. In 1858 a new phenomenon was noticed as occasionally occurring—she would sometimes wake from her second condition in a fit of terror, recognizing no one but her husband. The terror did not last long, however; and during sixteen years of her married life her husband only noticed this terror on thirty occasions.

A painful circumstance preceding her marriage somewhat forcibly exhibited the distinction between her two states of consciousness. Rigid in morality during her usual condition, she was shocked by the insults of a brutal neighbor, who told her of a confession made to M. Azam during her second condition, and accused her of shamming innocence. The attack —unfortunately but too well founded as far as facts were concerned— brought on violent convulsions, which

required medical attendance during two or three hours. It is important to notice the difference thus indicated between the character of the personalities corresponding to her two conditions. "Her moral faculties," says M. Azam, "were incontestably sound in her second life, though different," —by which, be it understood, he means simply that her sense of right and wrong was just during her second condition; not, of course, that her conduct was irreproachable. She was in this condition, as in the other, altogether responsible for her actions. But her power of self-control, or rather perhaps the relative power of her will as compared with tendencies to wrong-doing, was manifestly weaker during her second condition. In fact, in one condition she was oppressed and saddened by pain and anxiety, whereas in the other she was almost free from pain, gay, light-hearted and hopeful. Now I cannot altogether agree with Mr. Slack's remark, that if, during her second state, "she had committed a robbery or an assassination, no moral responsibility could have been assumed to rest upon her with any certainty, by any one acquainted with her history," for her moral faculties in her second condition being incontestably sound, she was clearly responsible for her actions while in that condition. But certainly, the question of punishment for such an offence would be not a little complicated by her two-fold personality. To a woman, in her ordinary condition, remembering nothing of the crime committed (on the supposition we are dealing with), in her abnormal condition, punishment for that crime would certainly seem unjust, seeing that her liability to enter into that condition had not in any degree depended on her own will. The drunkard who, waking in the morning with no recollection of the events of the past night, finds himself in jail for some crime committed during that time, although he may think the punishment he has to endure severe measure for a crime of which in his ordinary condition he is incapable, knows at least that he is responsible for placing himself under that influence which made the crime possible. Supposing even he had not had sufficient experience of his own character when under the influence of liquor, to have reason to fear he might be guilty of the offence, he yet perceives that to make intoxication under any circumstances an excuse for crime would be most dangerous to the community, and that he suffers punishment justly. But the case of dual consciousness is altogether different, and certainly where responsibility exists under both conditions, while yet impulse and the restraining power of will are differently related in one and the other condition, the problem of satisfying justice is a most perplexing one. Here are in effect two different persons residing in one body, and it is impossible to punish one without punishing the other also. Supposing justice waited until the abnormal condition was resumed, then the offender would probably recognize the justice of punishment; but if the effects of the punishment continued until the usual condition returned, a person would suffer who was conscious of no crime. If the offence were murder, and if capital punishment were inflicted, the ordinary individuality, innocent entirely of murder, would be extinguished along with the first, a manifest injustice. As Huxley says of a similar case, "the problem of responsibility is here as complicated as that of a prince-bishop, who swore as a prince and not as a bishop. 'But, your highness, if the prince is damned, what will become of the bishop,' said the peasant." *

* Should any doubt whether these conditions of dual existence are a reality (a doubt, however, which the next case dealt with in the text should remove), we would remind them that a similar difficulty unmistakably existed in the case of Eng and Chang, the Siamese twins. It would have been almost impossible to inflict any punishment on one by which the other would not have suffered, and

It does not appear to me that there is in the case of Felida X. any valid reason for regarding the theory of two brains as the only available explanation. It is a noteworthy circumstance that the pains preceding each change of condition affected both sides of the head. Some modification of the circulation seems suggested as the true explanation of the changes in condition, though the precise nature of such modification, or how it may have been brought about, would probably be very difficult to determine. The state of health, however, on which the attacks depended seems to have affected the whole body of the patient, and the case presents no features suggesting any lateral localization of the cerebral changes.

On the other hand, the case of Sergeant F. (a few of the circumstances of which were mentioned in my essay entitled "Have we two Brains?") seems to corresespond with Dr. Holland's theory, though that theory is far from explaining all the circumstances. The man was wounded by a bullet which fractured his *left* parietal bone, and his *right* arm and leg were almost immediately paralyzed. When he recovered censciousness three weeks later, the *right* side of the body was completely paralyzed, and remained so for a year. These circumstances indicate that the cause of the mischief still existing lay in the shock which the left side of the brain received when the man was wounded. The right side may have learned (as it were) to exercise the functions formerly belonging to the left side, and thus the paralysis affecting the right side until this had happened may have passed away. These points are discussed in the essay above named, however, and need not here detain us. Others which were not then dealt with may now be noted with advantage. We would specially note some which render it doubtful whether in the abnormal condition the man's brain acts at all, whether in fact his condition, so far as consciousness is concerned, is not similar to that of a frog deprived of its brain in a certain well-known experiment. (This appears to be the opinion to which Professor Huxley inclines, though, with proper scientific caution, he seems disposed to suspend his judgment.) The facts are very singular, whatever the explanation may be.

In the normal condition, the man is what he was before he was wounded —an intelligent, kindly fellow, performing satisfactorily the duties of a hospital attendant. The abnormal state is ushered in by pains in the forehead, as if caused by the constriction of a band of iron. In this state the eyes are open and the pupils dilated. (The reader will remember Charles Reade's description of David Dodd's eyes, "like those of a seal.") The eyeballs work incessantly and the jaws maintain a chewing motion. If the man is *en pays de connaissance*, he walks about as usual; but in a new place, or if obstacles are set in his way, he stumbles, feels about with his hands, and so finds his way. He offers no resistance to any forces which may act upon him, and shows no signs of pain if pins are thrust into his body by kindly experimenters. No noise affects him. He eats and drinks apparently without tasting or smelling his food, accepting assafœtida or vinegar as readily as the finest claret. He is sensible to light only under certain conditions. But the sense of touch is strangely exalted (in all respects apparently except as to sensations of pain or pleasure), taking, in fact, the place of all the other senses. I say the sense of touch, but it is not clear whether there is any real sensation at all. The man appears in the abnormal condition to be a mere machine. This is strikingly exemplified in the following case, which I translate directly from Dr. Mesnet's account: "He was walking in the garden, under a group of trees, and his

capital punishment inflicted on one would have involved the death of the other.

stick, which he had dropped a few minutes before, was placed in his hands. He feels it, moves his hand several times along the bent handle of the stick, becomes watchful, seems to listen, suddenly he calls out, 'Henry!' then, 'There they are! there are at least a score of them! Join us two; we shall manage it.' And then, putting his hand behind his back, as if to take a cartridge, he goes through the movement of loading his weapon, lays himself flat on the grass, his head concealed by a tree, in the posture of a sharpshooter, and with shouldered weapon follows all the movements of the enemy, whom he fancies he sees at a short distance." This, however, is an assumption; the man cannot in this state *fancy* he sees, unless he has at least a recollection of the sensation of sight, and this would imply cerebral activity. Huxley, more cautious, says justly that the question arises "whether the series of actions constituting this singular pantomime was accompanied by the ordinary states of consciousness or not? Did the man dream that he was skirmishing? or was he in the condition of one of Vaucanson's automata—a mechanism worked by molecular changes in his nervous system? The analogy of the frog shows that the latter assumption is perfectly justifiable."

The pantomimic actions just related corresponded to what probably happened a few moments before the man was wounded; but this human automaton (so to call him, without theorizing as to his actual condition) goes through other performances. He has a good voice, and was at one time a singer in a *café*. "In one of his abnormal states he was observed to begin humming a tune. He then went to his room, dressed himself carefully, and took up some parts of a periodical novel which lay on his bed, as if he were trying to find something. Dr. Mesnet, suspecting that he was seeking his music, made up one of these into a roll and put it into his hand. He appeared satisfied, took up his cane and went downstairs to the door. Here Dr. Mesnet turned him round, and he walked quite contentedly in the opposise direction, toward the room of the *concierge* The light of the sun shining through a window now happened to fall upon him, and seemed to suggest the footlights of the stage on which he was accustomed to make his appearance. He stopped, opened his roll of imaginary music, put himself into the attitude of a singer, and sung, with perfect execution, three songs, one after the other, after which he wiped his face with his handkerchief and drank, without a grimace, a tumbler of strong vinegar and water which was put into his hand."

But the most remarkable part of the whole story is that which follows: "Sitting at a table in one of his abnormal states, Sergeant F. took up a pen, felt for paper and ink, and began to write a letter to his general, in which he recommended himself for a medal on account of his good conduct and courage." (Rather a strange thing, by the way, for a mere automaton to do.) "It occurred to Dr. Mesnet to ascertain experimentally how far vision was concerned in this act of writing. He therefore interposed a screen between the man's eyes and his hands; under these circumstances, F. went on writing for a short time, but the words became illegible, and he finally stopped, without manifesting any discontent. On the withdrawal of the screen, he began to write again where he had left off. The substitution of water for ink in the inkstand had a similar result. He stopped, looked at his pen, wiped it on his coat, dipped it in the water and began again, with a similar result. On another occasion, he began to write upon the topmost of ten superimposed sheets of paper. After he had written a line or two, this sheet was suddenly drawn away. There was a slight expression of surprise, but he continued his letter on the second sheet exactly as if it had been the first. This operation was repeated five times, so that the fifth

sheet contained nothing but the writer's signature at the bottom of the page. Nevertheless, when the signature was finished, his eyes turned to the top of the blank sheet and he went through the form of reading what he had written—a movement of the lips accompanying each word; moreover, with his pen, he put in such corrections as were needed, in that part of the blank page which corresponded with the position of the words which required correction in the sheets which had been taken away. If the five sheets had been transparent, therefore, they would, when superposed, have formed a properly-written and corrected letter. Immediately after he had written his letter, F. got up, walked down to the garden, made himself a cigarette, lighted and smoked it. He was about to prepare another, but sought in vain for his tobacco-pouch, which had been purposely taken away. The pouch was now thrust before his eyes and put under his nose, but he neither saw nor smelled it; when, however, it was placed in his hand, he at once seized it, made a fresh cigarette, and ignited a match to light the latter. The match was blown out and another lighted match placed before his eyes, but he made no attempt to take it; and if his cigarette was lighted for him, he made no attempt to smoke. All this time his eyes were vacant, and neither winked nor exhibited any contraction of the pupil."

These and other similar experiments are explained by Dr. Mesnet (and Professor Huxley appears to agree with him) by the theory that F. "sees some things and not others; that the sense of sight is accessible to all things which are brought into relation with him by the sense of touch, and, on the contrary, insensible to all things which lie outside this relation." It seems to me that the evidence scarcely supports this conclusion. In every case where F. appears to see, it is quite possible that in reality he is guided entirely by the sense of touch. All the circumstances accord much better with this explanation than with the theory that the sense of sight was in any way affected. Thus the sunlight shining through the window must have affected the sense of touch, and in a manner similar to what F. had experienced when before the footlights of the stage, where he was accustomed to appear as a singer. In this respect there was a much closer resemblance between the effect of sunlight and that of the light from footlights, than in the circumstances under which both sources of light affect the sense of sight. For in one case the light came from above, in the other from below; the heat would in neither case be sensibly localized. Again, when a screen was interposed between his eyes and the paper on which he was writing, he probably became conscious of its presence in the same way that a blind man is conscious of the presence of objects near him, even (in some cases) of objects quite remote, by some subtle effects discernible by the sense of touch excited to abnormal relative activity in the absence of impressions derived from the sense of sight. It is true that one might have expected him to continue writing legibly, notwithstanding the interposed screen; but the consciousness of the existence of what in his normal condition would effectually have prevented his writing legibly, would be sufficient to explain his failure. If, while in full possession of all our senses, the expectation of failure quite commonly causes failure, how much more likely would this be to happen to a man in F.'s unfortunate abnormal condition. The sense of touch again would suffice to indicate the presence of water instead of ink in his pen when he was writing. I question whether the difference might not be recognized by any person of sensitive touch after a little practice; but certainly a blind man, whose sense of touch was abnormally developed, would recognize the difference, as we know from experiments which have indicated even greater delicacy of perception than would be required

for this purpose. The experiment with superposed sheets of paper is more remarkable than any of the others, but certainly does not suggest that light makes any impression upon Sergeant F. It proves, in fact, so far as any experiment could prove such a point, that the sense of touch alone regulates the man's movements. Unconscious of any change (because, after the momentary surprise produced by the withdrawal of the paper, he still found he had paper to write on), he continued writing. He certainly did not in this case, as Dr. Mesnet suggests, see all things which are brought into relation with him by the sense of touch; for if he had, he would not have continued to write when he found the words already written no longer discernible.

On the whole, it appears reasonable to conclude, as Professor Huxley does, that though F. may be conscious in his abnormal state, he may also be a mere automaton for the time being. The only circumstance which seems to oppose itself very markedly to the latter view is the letter-writing. Everything else that this man did was what he had already done prior to the accident. If it could be shown that the letters written in his abnormal state were transcripts, not merely *verbatim et literatim*, but exact in every point, of some which he had written before he was wounded, then a strong case would be made out for the automaton theory. Certainly, few instances have come under the experience of scientific men where a human being has so closely resembled a mere machine as this man appears to do in his abnormal condition.

The moral nature of F. in his abnormal condition is for this reason a matter of less interest than it would be, did he show more of the semblance of conscious humanity. Still it is worthy of notice, that, whereas in his normal condition he is a perfectly honest man, in his abnormal state "he is an inveterate thief, stealing and hiding away whatever he can lay his hands on with much dexterity, and with an absolutely absurd indifference as to whether the property is his own or not."

It will be observed that the cases of dual consciousness thus far considered, though alike in some respects, present characteristic divergences. In that of the boy at Norwood, the two characters were very similar, so far as can be judged, and each life was distinct from the other. The next case was only introduced to illustrate the resemblance in certain respects between the phenomena of somnambulism and those of double or rather alternating consciousness. The woman Felida X. changed markedly in character when she passed from one state to the other. Her case was also distinguished from that of the boy by the circumstance that in one state she was conscious of what had passed in the other, but while in this other state was unconscious of what had passed in the former. Lastly, in Sergeant F.'s case we have to deal with the effect of an injury to the brain, and find a much greater difference between the two conditions than in the other cases. Not only does the man change in character, but it may justly be said that he is little more than an animal, even if he can be regarded as more than a mere automaton while in the abnormal condition. We find that a similar variety characterizes other stories of double consciousness. Not only are no two cases closely alike, but no case has been noted which has not been distinguished by some very marked feature from all others.

Thus, although in certain respects the case we have next to consider resembles very significantly the case of Sergeant F., it also has a special significance of its own, and may help us to interpret the general problem presented to us by the phenomena of dual consciousness. I abridge and in some respects simplify the account given by Dr. Carpenter in his interesting treatise on *Mental Physiology*. Comments of my own are distinguished from the abridged narra

tive by being placed within brackets:

A young woman of robust constitution had narrowly escaped drowning. She was insensible for six hours, and continued unwell after being restored to animation. Ten days later she was seized with a fit of complete stupor, which lasted four hours; when she opened her eyes she seemed to recognize no one, and appeared to be utterly deprived of the senses of hearing, taste and smell, as well as of the power of speech. Sight and touch remained, but though movements were excited and controlled by these senses, they seemed to arouse no ideas in her mind. In fact, her mental faculties seemed entirely suspended. Her vision at short distances was quick, and the least touch startled her; but unless she was touched or an object were placed where she could not help seeing it, she took no notice of what was passing around her. [It does not appear to me certain that at this stage of her illness she *saw* in the ordinary sense of the word; the sense of touch may alone have been affected, as it certainly is affected to some degree by an object so placed that *it could not but be seen by a short-sighted person.* But it is clear that later the sense of sight was restored, supposing, which is not perhaps probable, that it was ever lost in the early stage.] She did not even know her own mother, who attended constantly upon her. Wherever she was placed she remained. Her appetite was good, but [like F.] she ate indifferently whatever she was fed with, and took nauseous medicines as readily as agreeable food. Her movements were solely of the automatic kind. Thus, she swallowed food put into her mouth, but made no effort to feed herself. Yet when her mother had conveyed the spoon [in the patient's hand] a few times to her mouth, the patient continued the operation. It was necessary, however, to repeat this lesson every time she was fed, showing the complete absence of memory. "The very limited nature of her faculties, and the automatic life she was leading, appear further evident from the following particulars. One of her first acts on recovering from the fit had been to busy herself in picking the bedclothes; and as soon as she was able to sit up and be dressed, she continued the habit by incessantly picking some portion of her dress. She seemed to want an occupation for her fingers, and accordingly part of an old straw bonnet was given to her, which she pulled into pieces with great minuteness; she was afterwards bountifully supplied with roses: she picked off the leaves, and then tore them up into the smallest particles imaginable. A few days subsequently, she began forming upon the table, out of those minute particles, rude figures of roses and other common garden flowers; she had never received any instructions in drawing. Roses not being so plentiful in London, waste paper and a pair of scissors were put into her hand, and for some time she found an occupation in cutting the paper into shreds; after a time these cuttings assumed rude shapes and figures, and more particularly the shapes used in patchwork. At length she was supplied with proper materials for patchwork, and after some initiatory instruction, she took to her needle and to this employment in good earnest. She now labored incessantly at patchwork from morning till night, and on Sunday and week-days, for she knew no difference of days; nor could she be made to comprehend the difference. She had no remembrance from day to day of what she had been doing on the previous day, and so every morning commenced *de novo.* Whatever she began that she continued to work at while daylight lasted; manifesting no uneasiness for anything to eat or drink, taking not the slightest heed of anything which was going on around her, but intent only on her patchwork." From this time she began to improve, learning like a child to register ideas. She presently

learned worsted-work, and showed delight in the harmony of colors and considerable taste in selecting between good and bad patterns. After a while she began to devise patterns of her own. But still she had no memory from day to day of what she had done, and unless the unfinished work of one day was set before her on the next, she would begin something new.

And now, for the first time, ideas derived from her life before her illness seemed to be awakened within her. When pictures of flowers, trees, and animals were shown her, she was pleased; but when she was shown a landscape in which there was a river or a troubled sea, she became violently agitated, and a fit of spasmodic rigidity and insensibility immediately followed. The mere sight of water in motion made her shudder. Again, from an early stage of her illness she had derived pleasure from the proximity of a young man to whom she had been attached. At a time when she did not remember from one hour to another what she was doing, she would anxiously await his evening visit, and be fretful if he failed to pay it. When, during her removal to the country, she lost sight of him, she became unhappy and suffered from frequent fits; on the other hand, when he remained constantly near her, she improved in health, and early associations were gradually awakened.

At length a day came when she uttered her first words in this her second life. She had learned to take heed of objects and persons around her; and on one occasion seeing her mother excessively agitated, she became excited herself, and suddenly, yet hesitatingly, exclaimed, "What's the matter?" After this she began to articulate a few words. For a time she called every object and person "this," then gave their right names to wild flowers (of which she had been passionately fond when a child), and this "at a time when she exhibited not the least recollection of the 'old familiar friends and places' of her childhood." The gradual expansion of her intellect was manifested chiefly at this time in signs of emotional excitement, frequently followed by attacks of spasmodic rigidity and insensibility.

It was through the emotions that the patient was restored to the consciousness of her former self. She became aware that her lover was paying attention to another woman, and the emotion of jealousy was so strongly excited, that she had a fit of insensibility which resembled her first attack in duration and severity. But it restored her to herself. "When the insensibility passed off, she was no longer spell-bound. The veil of oblivion was withdrawn; and, as if awakening from a sleep of twelve months' duration, she found herself surrounded by her grandfather, grandmother, and their familiar friends and acquaintances. She awoke in the possession of her natural faculties and former knowledge, but without the slightest remembrance of anything which had taken place in the year's interval, from the invasion of the first fit to the [then] present time. She spoke, but she heard not; she was still deaf, but being able to read and write as formerly, she was no longer cut off from communication with others. From this time she rapidly improved, but for some time continued deaf. She soon perfectly understood by the motion of her lips what her mother said; they conversed with facility and quickness together, but she did not understand the language of the lips of a stranger. She was completely unaware of the change in her lover's affections which had taken place in her state of second consciousness, and a painful explanation was necessary. This, however, she bore very well; and she has since recovered her previous bodily and mental health.

There is little in this interesting narrative to suggest that the duality of consciousness in this case was in any way dependent on the duality of the brain. During the patient's ab-

normal condition, the functions of the brain [proper] would seem to have been for a time in complete abeyance, and then to have been gradually restored. One can perceive no reason for supposing that the shock she had sustained would affect one side rather than the other side of the brain, nor why her recovery should restore one side to activity and cause the side which (on the dual brain hypothesis) had been active during her second condition to resume its original activity. The phenomena appear to suggest that in some way the molecular arrangement of the brain matter became modified during her second condition; and that when the original arrangement was restored all recognizable traces of impressions received while the abnormal arrangement lasted were obliterated. As Mr. Slack presents one form of this idea, "the grey matter of the brain may have its molecules arranged in patterns somewhat analogous to those of steel filings under the influence of a magnet, but in some way the direction of the forces—or vibrations—may be changed in them. The pattern will then be different." We know certainly that thought and sensation depend on material processes,—chemical reaction between the blood and the muscular tissues. Without the free circulation of blood in the brain, there can be neither clear thought nor ready sensation. With changes in the nature of the circulation come changes in the quality of thought and the nature of sensation, and with them the emotions are changed also. Such changes affect all of us to some degree. It may well be that such cases as we have been dealing with are simply instances of the exaggerated operation of causes with which we are all familiar; and it may also be that in the exaggeration itself of these causes of change lies the explanation of the characteristic peculiarity of cases of dual consciousness—the circumstances, namely, that either the two states of consciousness are absolutely distinct one from the other, or that in one state only are events remembered which happened in the other, no recollection whatever remaining in this latter state of what happened in the other, or lastly, that only faint impressions excited by some intense emotion experienced in one state remain in the other state.

It seems possible, also, that some cases of another kind may find their explanation in this direction, as, for instance, cases in which, through some strange sympathy, the brain of one person so responds to the thoughts of another, that for the time being the personality of the person thus influenced may be regarded as in effect changed into that of the person producing the influence. Thus, in one singular case cited by Dr. Carpenter, a lady was "metamorphosed into the worthy clergyman on whose ministry she attended, and with whom she was personally intimate. I shall never forget," he says, "the intensity of the lackadaisical tone in which she replied to the matrimonial counsels of the physician to whom he (she) had been led to give a long detail of his (her) hypochondriacal symptoms: 'A wife for a dying man, doctor.' No *intentional* simulation could have approached the exactness of the imitation alike in tone, manner, and language, which spontaneously proceeded from the idea with which the fair subject was possessed, that she herself experienced all the discomforts whose detail she had doubtless frequently heard from the real sufferer." The same lady, at Dr. Carpenter's request, mentally "ascended in a balloon and proceeded to the North Pole in search of Sir John Franklin, whom she found alive; and her description of his appearance and that of his companions was given with an inimitable expression of sorrow and pity."

It appears to us that very great interest attaches to the researches made by Prof. Barrett into cases of this kind, and that it is in this direction we are to look for the explanation of many mysterious phenomena formerly regarded as supernatural, but probably all admitting (at least all that

have been properly authenticated) of being interpreted so soon as the circumstances on which consciousness depends shall have been determined. Thus the following account of experiments made at the village school in Westmeath seem especially suggestive: "Selecting some of the village children, and placing them in a quiet room, giving each some small object to look at steadily, he found one amongst the number who readily passed into a state of reverie. In that state the subject could be made to believe the most extravagant statements, such as that the table was a mountain, a chair a pony, a mark on the floor an insuperable obstacle. The girl thus mesmerized passed on the second occasion into a state of deeper sleep or trance, wherein no sensation whatever was experienced, unless accompanied by pressure on the eyebrows of the subject. When the pressure of the fingers was removed, the girl fell back in her chair utterly unconscious of all around, and had lost all control over her voluntary muscles. On reapplying the pressure, though her eyes remained closed, she sat up and answered questions readily, but the manner in which she answered them, her acts and expressions, were capable of wonderful diversity, by merely altering the place on the head where the pressure was applied. So sudden and marked were the changes produced by a movement of the fingers, that the operation seemed very like playing on some musical instrument. On a third occasion the subject, after passing through these, which have been termed the biological and phrenological states, became at length keenly and wonderfully sensitive to the voice and acts of the operator. It was impossible for the latter to call the girl by her name, however faintly and inaudibly to those around, without at once eliciting a prompt response. If the operator tasted, smelt, or touched anything, or experienced any sudden sensation of warmth or cold, a corresponding effect was produced on the subject, though nothing was said, nor could the subject have seen what had occurred to the operator. To be assured of this he bandaged the girl's eyes with great care, and the operator having gone behind the girl to the other end of the room, he watched him and the girl, and repeatedly assured himself of this fact." Thus far, Professor Barrett's observations, depending in part on what the operator experienced, may be open to just so much doubt as may affect our opinion of the veracity of a person unknown; but in what follows we have his own experience alone to consider. "Having mesmerized the girl himself, he took a card at random from a pack which was in a drawer in another room. Glancing at the card to see what it was, he placed it within a book, and in that state brought it to the girl. Giving her the closed book, he asked her to tell him what he had put within its leaves. She held the book close to the side of her head, and said, 'I see something inside with red spots on it'; and she afterwards said there were five red spots on it. The card was the five of diamonds. The same result occurred with another card; and when an Irish banknote was substituted for the card, she said, 'Oh, now I see a number of heads—so many that I cannot count them.' He found that she sometimes failed to guess correctly, asserting that the things were dim; and she could give no information of what was within the book unless he had previously known what it was himself. More remarkably still, he asked her to go in imagination to Regent Street, in London, and tell him what shops she had seen. The girl had never been out of her remote village, but she correctly described to him Mr. Ladd's shop, of which he happened to be thinking, and mentioned the large clock that overhangs the entrance to Beak Street. In many other cases he convinced himself that the existence of a distinct idea in his own

mind gave rise to an image of the idea (that is, to a corresponding image) on the mind of the subject; not always a clear image, but one that could not fail to be recognized as a more or less distorted reflection of his own thought." It is important to notice the limit which a scientific observer thus recognized in the range of the subjects' perception. It has been stated that subjects in this condition have been able to describe occurrences not known to any person, which yet have been subsequently verified. Although some narratives of the kind have come from persons not likely to relate what they *knew* to be untrue, the possibility of error outweighs the probability that such narratives can really be true. There is a form of unconscious cerebration by which untruthful narratives come to be concocted in the mind. For instance, Dr. Carpenter heard a scrupulously conscientious lady asseverate that a table "rapped" when nobody was within a yard of it; but the story was disproved by the lady herself, who found from her note-book, recording what really took place, that the hands of six persons rested on the table when it rapped. And apart from the unconscious fiction-producing power of the mind, there is always the possibility, nay, often the extreme probability, that the facts of a case may be understood. Persons may be supposed to know nothing about an event who have been conscious of its every detail; nay, a person may himself be unconscious of his having known, and in fact of his really knowing, of a particular event. Dual consciousness in this particular sense is a quite common experience, as, for instance, when a story is told us which we receive at first as new, until gradually the recollection dawns upon us and becomes momentarily clearer and clearer, not only that we have heard it before, but of the circumstances under which we heard it, and even of details which the narrator from whom a few moments before we receive it as a new story has omitted to mention.*

The most important of all the questions depending on dual consciousness is one into which I could not properly enter at any length in these pages—the question, namely, of the relation between the condition of the brain and responsibility, whether such responsibility be considered with reference to human laws or to a higher and all-knowing tribunal. But there are some points not wanting in interest which may be here more properly considered.

In the first place it is to be noticed that a person who has passed into a state of abnormal consciousness, or who is in the habit of doing so, can have no knowledge of the fact in his normal condition except from the information of others. The boy at Norwood might be told of what he had said and done while in his less usual condition, but so far as any experience of his own was concerned, he might during all that time have been

* An instance of the sort turns up in Pope's correspondence with Addison, and serves to explain a discrepancy between Tickell's edition of the *Spectator* and the original. In No. 253, Addison had remarked that none of the critics had taken notice of a peculiarity in the description of Sisyphus lifting his stone up the hill, which is no sooner carried to the top of it but it immediately tumbles to the bottom. "This double motion," says Addison, "is admirably described in the numbers of those verses. In the four first it is heaved up by several spondees intermixed with proper breathing places, and at last trundles down in a continual line of dactyls." On this Pope remarks: "I happened to find the same in Dionysius of Halicarnassus's Treatise, who treats very largely upon these verses. I know you will think fit to soften your expression, when you see the passage, which you must needs have read, though it be since slipt out of your memory." These words, by the way, were the last (except "I am, with the utmost esteem, &c.") ever addressed by Pope to Addison. It was in this letter that Pope with sly malice asked Addison to look over the first two books of his (Pope's) translation of Homer.

in a profound sleep. Similarly of all the other cases. So that we have here the singular circumstance to consider, that a person may have to depend on the information of others respecting his own behavior—not during sleep or mental aberration or ordinary absence of mind—but (in some cases at least) while in possession of all his faculties and unquestionably responsible for his actions. Not only might a person find himself thus held responsible for actions of which he had no knowledge, and perhaps undeservedly blamed or condemned, but he might find himself regarded as untruthful because of his perfectly honest denial of all knowledge of the conduct attributed to him. If such cases were common, again, it would not improbably happen that the simulation of dual consciousness would become a frequent means of attempting to evade responsibility.

Another curious point to be noticed is this. Supposing one subject to alternations of consciousness were told that in his abnormal condition he suffered intense pain or mental anguish in consequence of particular actions during his normal state, how far would he be influenced to refrain from such actions by the fear of causing pain or sorrow to his "double," a being of whose pains and sorrows, nay, of whose very existence, he was unconscious? In ordinary life a man refrains from particular actions which have been followed by unpleasant consequences, reasoning, in some cases, "I will not do so-and-so, because I suffered on such and such occasions when I did so" (we set religious considerations entirely on one side by assuming that the particular actions are not contrary to any moral law), in others, "I will not do so-and-so, because my so doing on former occasions has caused trouble to my friend A or B;" but it is strange to imagine any one reasoning, "I will not do so-and-so, because my so doing on former occasions has caused my second self to experience pain and anguish, of which I myself have not the slightest recollection." A man may care for his own well-being, or be unwilling to bring trouble on his friends, but who is that second self that his troubles should excite the sympathy of his fellow-consciousness? The considerations here touched on are not so entirely beyond ordinary experience as might be supposed. It may happen to any man to have occasion to enter into an apparently unconscious condition during which in reality severe pains may be suffered by another self, though on his return to his ordinary condition no recollection of those pains may remain, and though to all appearance he has been all the time in a state of absolute stupor; and it may be a reasonable question, not perhaps whether he or his double shall suffer such pains, but whether the body which both inhabit will suffer while he is unconscious, or while that other consciousness comes into existence. That this is no imaginary supposition is shown by several cases in Abercrombie's treatise on the "Intellectual Powers." Take, for instance, the following narrative: "A boy," he tells us, "at the age of four suffered fracture of the skull, for which he underwent the operation of the trepan. He was at the time in a state of perfect stupor, and after his recovery retained no recollection either of the accident or of the operation. At the age of fifteen, however, during the delirium of fever, he gave his mother an account of the operation, and the persons who were present at it, with a correct description of their dress, and other minute particulars. He had never been observed to allude to it before; and no means were known by which he could have acquired the circumstances which he mentioned." Suppose one day a person in the delirium of fever or under some other exciting cause should describe the tortures experienced during some operation, when, under the influence of anæsthetics, he had appeared to all around to be totally unconscious, dwelling in a special man-

ner perhaps on the horror of pains accompanied by utter powerlessness to shriek or groan, or even to move; how far would the possibilities suggested by such a narrative influence one who had a painful operation to undergo, knowing as he would quite certainly, that whatever pains his *alter ego* might have to suffer, not the slightest recollection of them would remain in his ordinary condition?

There is indeed almost as strange a mystery in unconsciousness as there is in the phenomena of dual consciousness. The man who has passed for a time into unconsciousness through a blow, or fall, or fit, cannot help asking himself Like Bernard Langdon in that weird tale Elsie Venner, "Where was the mind, the soul, the thinking principle all the time?" It is irresistibly borne in upon him that he has been dead for a time. As Holmes reasons, "a man is stunned by a blow and becomes unconscious, another gets a harder blow and it kills him. Does he become unconscious too? If so, *when*, and *how does he come to his consciousness?* The man who has had a slight and moderate blow comes to himself when the immediate shock passes off and the organs begin to work again, or when a bit of skull is 'pried' up, if that happens to be broken. Suppose the blow is hard enough to spoil the brain and stop the play of the organs, what happens then?" So far as physical science is concerned, there is no answer to this question; but physical science does not as yet comprehend all the knowable and the knowable comprehends not all that has been, is, and will be. What we know and can know is nothing, the unknown and the unknowable are alike infinite.

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